MATHEMATICA Policy Research

REPORT

FINAL

Evaluation of the Round Two Health Care Innovation Awards (HCIA R2): Second Annual Report

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HCIA R2 AWARDEE GROUPS AND ACRONYMS/ABBREVIATIONS

Group and awardee	Acronym/ abbreviation
Youth and young adults with chronic or complex medical conditions	
Board of Trustees of the University of Illinois, Chicago	UIC
Boston Medical Center	BMC
National Association of Children's Hospitals and Related Institutions	NACHRI
Seattle Children's Hospital	SCH
Wisconsin Department of Health Services	WI DHS
Adults with chronic physical conditions—high risk	
Detroit Medical Center	DMC
Four Seasons Compassion for Life	FSCL
Nebraska Medical Center	NM
New York City Health + Hospitals	NYC H+H
Northwell Health	Northwell
Regents of the University of California at San Diego	UCSD
University Hospitals Cleveland Medical Center	UHCMC
University of Kansas Hospital Authority	U KS
Adults with chronic physical conditions—lower risk	
American College of Cardiology Foundation	ACCF
Catholic Health Initiatives Iowa Corp., DBA Mercy Medical Center–Des Moines	CHIIC
Community Care of North Carolina	CCNC
Fund for Public Health in New York, Inc.	FPHNY
George Washington University	GWU
Ventura County Health Care Agency	Ventura
Village Center for Care	VillageCare
Individuals (adults, young adults, or children) with behavioral health or cognitive disorders	
Amerigroup	Amerigroup
Clifford W. Beers Guidance Clinic, Inc.	Clifford Beers
Johns Hopkins University	Hopkins
Montefiore Medical Center	Montefiore
Regents of the University of California at San Francisco	UCSF
Adults who are seeking or who recently received acute or sub-acute care	
CareChoice Cooperative	CCC
City of Mesa Fire and Medical Department	Mesa
Icahn School of Medicine at Mount Sinai	Icahn
National Health Care for the Homeless Council	NHCHC
Regents of the University of Michigan	UMich
University of New Mexico, Health Sciences Center	UNM
Individuals (adults, young adults, or children) who need primary or preventive care	
Altarum Institute	Altarum
Association of American Medical Colleges	AAMC
Avera Health	Avera
Children's Home Society of Florida	CHS
Trustees of Columbia University in the City of New York	Columbia
University of North Carolina at Chapel Hill	U NC
Washington University School of Medicine	Wash U
Yale University	Yale

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EXECUTIVE SUMMARY

Introduction

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). Thirty-nine organizations were awarded three-year cooperative agreements to implement their proposed innovative models for improving the quality of both care and health, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research, under contract to CMS, is evaluating the extent to which the awardees have been successful in implementing their programs and in accomplishing these goals.

This report, the second of four annual evaluation reports that we will submit to CMMI, describes the awardees' implementation experiences during the second program year (September 2015 to August 2016) and examines the pre-enrollment characteristics of their participants. The report has three general purposes:

1. To highlight changes in program characteristics, including modifications that awardees made to their service delivery and payment models during their second program year (Chapter II).
2. To assess the effectiveness with which the awardees implemented their programs (including their sustainability plans) and to identify the barriers and facilitators that the awardees encountered during the second program year (Chapter III).
3. To begin the impact evaluation process by updating our initial assessment of the evaluability of each program and by examining the baseline characteristics of the Medicare (or Medicaid) beneficiaries served by the programs during the first 21 months of operations (Chapter IV).

We based our analysis of program implementation on a review of the awardees' self-reports and telephone interviews with program administrators and frontline staff. Self-reports covered the fifth through the eighth program quarters (September 2015 to August 2016). The interviews were conducted at up to three implementing sites per awardee, from July through September 2016. In addition, we used program enrollment data (through August 2016) that the awardees provided to the implementation and monitoring contractor to describe how the number of program participants to date compares to the awardees' third-year target levels. Our assessment of implementation progress is based on self-reported information; we were unable to independently verify what the awardees reported to us.

Our baseline analysis for the impact evaluation is based on Medicare (and, for five awardees, Medicaid) enrollment and claims data for participants who were served from program inception through May 31, 2016—that is, three months before the end of the second program year, which allowed for sufficient claims run-out.

Appendix A of this report describes the key evaluation challenges that remain with respect to the identification of credible comparison groups, which is the most significant challenge in the use of quasi-experimental designs for program evaluation. The appendix also describes our proposed strategies for addressing these challenges. Our technical specifications for calculating baseline outcomes from Medicare and Medicaid enrollment and claims data for this evaluation are available on request. Appendix B includes 39 awardee-specific narratives, which formed the basis for the implementation and impact syntheses in the main body of this report.[1]

Key findings from the implementation evaluation

During the second year of the evaluation, we focused on four aspects of implementation: (1) program enrollment, (2) implementation of the service delivery models, (3) development and implementation of the payment models, and (4) sustainability plans. Most awardees made significant progress meeting their service delivery goals, but more than half continued to struggle with enrollment and most have only recently started creating detailed payment models or plans for sustaining their programs after the end of their cooperative agreements (see Table ES.1).

Table ES.1. Awardee progress meeting implementation goals at end of Year 2

Acronym/ abbreviation	Awardee	Enroll-ment	Service delivery	Payment model	Sustain-ability
Youth and young adults with chronic or complex physical conditions (5 awardees)					
BMC	Boston Medical Center	O	X	O	O
NACHRI	National Association of Children's Hospitals and Related Institutions	X	X	O	X
SCH	Seattle Children's Hospital	X	X	O	X
UIC	The Board of Trustees of the University of Illinois	X	X	O	X
WI DHS	Wisconsin Department of Health Services		X	O	O
Adults with chronic conditions—high risk (8 awardees)					
DMC	Detroit Medical Center, Vanguard Health Systems		X		O
FSCL	Four Seasons Compassion for Life		X	O	O
NMC	The Nebraska Medical Center		X	O	O
Northwell	Northwell Health	X	X	O	O
NYC H+H	New York City Health and Hospitals Corporation	O	X		X
U KS	University of Kansas Hospital Authority		X	X	X
UCSD	Regents of the University of California San Diego	X	X	O	
UHCMC	University Hospitals Cleveland Medical Center	X	X	O	

[1] George Washington University voluntarily terminated its cooperative agreement with CMMI and withdrew from the HCIA R2 initiative effective September 1, 2016. As this report covers the second program year (September 1, 2015 to August 31, 2016) and George Washington University was in active status during this period, the awardee is included in the main body of the report and in Appendix B; however, it should be noted that George Washington University spent the last several months of the second program year in preparation for award closeout.

Table ES.I. *(continued)*

Acronym/ abbreviation	Awardee	Enroll-ment	Service delivery	Payment model	Sustain-ability
Adults with chronic conditions—lower risk (7 awardees)					
ACCF	American College Of Cardiology Foundation	O		O	O
CCNC	Community Care of North Carolina	X	X	O	O
CHIIC	Catholic Health Initiatives Iowa Corp.	X	X	O	X
FPHNY	Fund for Public Health in New York, Inc.	X	X	O	O
GWU	George Washington University				
Ventura	Ventura County Health Care Agency	X	X	X	X
VillageCare	Village Center for Care	X	X	O	O
People (adults, young adults, or children) with behavioral health or cognitive disorders (5 awardees)					
Amerigroup	Amerigroup	O	X		
Clifford Beers	Clifford W. Beers Guidance Clinic, Inc.	O	X		O
Hopkins	Johns Hopkins University	X	X	O	O
Montefiore	Montefiore Medical Center	X	X	O	X
UCSF	Regents of the University of California, San Francisco	O	X	O	O
Adults who are seeking or who recently received acute or sub-acute care (6 awardees)					
CCC	CareChoice Cooperative	O	X		O
Icahn	Icahn School of Medicine at Mount Sinai		X	O	O
Mesa	City of Mesa Fire and Medical Department	O		O	X
NHCHC	National Health Care for the Homeless Council		X	X	O
UMich	Regents of the University of Michigan				X
UNM	University of New Mexico, Health Sciences Center				O
People (adults, young adults, or children) who need primary or preventive care (8 awardees)					
AAMC	Association of American Medical Colleges	O	X		X
Altarum	Altarum Institute				O
Avera	Avera Health	O	X	O	X
CHS	Children's Home Society of Florida	O	X	O	
Columbia	Trustees of Columbia University in the City of New York	O	X		
U NC	The University of North Carolina at Chapel Hill				
Wash U	Washington University School of Medicine in St. Louis			O	X
Yale	Yale University		X	O	

Notes: For enrollment, an X indicates awardee is at or above two-thirds of its final enrollment goal, and an O indicates awardee is between one-half and two-thirds of its three-year target. For service delivery, an X indicates awardee has implemented its model largely according to plan, including engaging partners and providing the expected level of services. For payment model, an X indicates awardee has implemented or received CMS approval to implement a model, and an O indicates awardee has begun to develop a defined payment model. For sustainability, an X indicates awardee has begun implementing strategies for sustainment, and an O indicates awardee is actively pursuing strategies for sustaining its program.

Program enrollment

All awardees made significant progress with enrollment during the second year of their cooperative agreements. One-third (13 awardees) were on pace to meet their three-year enrollment targets—which is defined as being near, at, or beyond two-thirds of their final goal

for enrolling participants. Awardees focusing on youth with complex medical conditions and on adults with chronic physical conditions (high and lower risk) have made the most progress in meeting their enrollment targets. None of the 14 awardees that target people who generally need only acute or preventive care are on pace to meet their enrollment targets.

Although the awardees sought to increase enrollment in a variety of ways, the five cited most frequently were the following:

1. **Increasing access to potential participants** by expanding program service areas into new geographic locations, adding recruitment sites or service locations, and relaxing eligibility criteria in order to enroll beneficiaries who were once ineligible.
2. **Increasing staff capacity for recruitment** by hiring additional staff, assigning existing staff to focus exclusively on recruitment, making adjustments in staff-to-participant ratios, or using technology more effectively to support recruitment efforts.
3. **Engaging providers and partners** by leveraging relationships with internal and external stakeholders, educating providers and community partners about the value of the programs, offering incentives for making referrals, and making the referral processes easier.
4. **Motivating patients directly to engage in the program** by conducting community outreach to increase the perceived benefit of the program and to identify ways to remove barriers to participation.
5. **Obtaining and using electronic data,** including Medicaid or other patient registry or medical records data, to identify potential enrollees with specific diagnoses, with events that trigger enrollment, or with other characteristics that influence enrollment.

Implementation of service delivery models

The majority of awardees had fully implemented their service delivery models by the end of the second year of their cooperative agreements. Most had hired the program staff they needed, and they started providing participants with planned services. A few, however, were still struggling to implement important components of their service delivery models, particularly those related to health information technology (health IT), such as setting up web portals for patients and developing clinical decision-support tools for providers. Although most awardees made relatively minor refinements to their models, a handful of awardees continued to make significant changes, such as replacing their implementation partners or offering new services.

As the awardees' focus shifted from launching their programs to improving program operations, they identified several activities that facilitated implementation efforts (or impeded implementation if they were not done).

1. **Using quality self-monitoring processes** to improve the way in which care is delivered.
2. **Engaging providers and community organizations** to provide the full range of medical, behavioral, and social services specific to each intervention.

3. **Training staff and providing other professional resources** necessary for retaining staff and delivering high quality services.
4. **Creating a team-oriented program culture and supportive structures** to promote staff satisfaction and cooperation, and to facilitate the implementation of direct care services.
5. **Aligning programs with payers' priorities and reimbursement policies** because partners may be more willing to engage with the programs when Medicaid managed care plans and other local plans also emphasize the intervention activities.
6. **Keeping participants engaged in the programs** and overcoming barriers formed by hectic schedules, distrust of formal supports, competing needs, and lack of access to reliable transportation or child care.
7. **Connecting participants to needed community resources and social supports**, such as non-emergent after-hours care, housing support, and in-home care.
8. **Using health IT and other equipment** to analyze program data, improve communication with participants and community providers, and remind staff of policies and procedures.

Development and implementation of payment models

Progress in developing and implementing innovative payment models to help sustain program services after the end of the cooperative agreements varied substantially across awardees. Awardees are required to deliver, during or by the conclusion of the cooperative agreement period, a detailed and fully developed version of the payment model, as well as a list of payers interested in testing the payment and service delivery model. They are only expected to implement the payment model under the cooperative agreement if feasible. Reflecting the limitations of this requirement, by the end of Year 2, only three awardees had either implemented a model or received CMS approval to do so. A handful of awardees have signed or are expecting to sign agreements with payers during the third and final year of their cooperative agreements. However, the majority of awardees are still developing or refining their proposed payment models. Three awardees made little progress or had not yet developed a payment proposal by the end of the second program year.

Most awardees are focusing on payment models that move away from traditional fee-for-service (FFS) payment and toward alternative models. These include partially capitated payments, bundled or episode-based payments, and stand-alone shared savings contracts. Some payment models also link payment to performance or outcomes, whereas others incorporate upside and/or downside risk for providers. At the same time, nearly half of the awardees are planning to leverage Medicare's new billing codes for chronic care management and transitional care management, and several are proposing to work with Medicaid managed care and other local plans to create new benefits with their own FFS billing codes as part of their payment models. Many awardees are also pursuing different models with multiple payers, or they are expecting individual provider sites to negotiate their own payment models with payers.

Three factors in particular affected the awardees' progress in developing and implementing payment models during the second program year.

1. **Awardees' ability to build or maintain strong relationships with payers** by engaging them in early and ongoing negotiations and by designing payment models that are based on existing models or payment systems.
2. **Awardees' ability to demonstrate to payers that program services will lower costs and improve outcomes**—for example, by estimating the net cost savings that would be derived either from fewer emergency department visits and hospital readmissions or from averted helicopter transfers.
3. **Awardees' ability to obtain the data needed to establish a price point** for third-party reimbursement for new, bundled, or capitated services.

Sustainability, scalability, and replicability plans

By the end of Year 2, one-third of the awardees had begun to actively implement strategies for sustaining their programs after the HCIA R2 cooperative agreements end. We assigned these 13 awardees a high sustainment planning rating of 4 (on a scale of 1 to 4) for their level of planning. Most of these awardees have begun executing multiple activities to sustain their programs, including (1) securing post-award ongoing payments for their programs through public or private payers or through other funding, (2) establishing a commitment from providers and program staff that will last beyond the cooperative agreement, (3) adapting the program to be more efficient for easier sustainment, and (4) creating IT infrastructure to endure beyond the award period.

Awardees with a high sustainment planning rating were more likely to have (1) prior experience in implementing the program (or something similar), (2) met their enrollment targets, and (3) used passive enrollment processes. The eight awardees that received a relatively low sustainment planning rating (1 or 2) tended to struggle with immediate program implementation issues and low enrollment, which limited their ability to look to the future.

The degree of sustainment planning varies somewhat by the type of patients served. Awardees that enrolled youth and young adults with chronic or complex medical conditions have slightly higher sustainment planning ratings as a group than the other five awardee groups.

Because scaling and replicating typically follow successful implementation and sustainment, very few programs have been scaled or replicated to date. Some awardees' sustainment plans include replication activities because they can generate additional funding.

Awardees identified several factors that, when present, facilitate sustainability, scalability and replicability (SSR) and, when absent, create a barrier for SSR. These factors affect awardees' ability to achieve their main aim for SSR—that is, to demonstrate that their programs have positive impacts on costs and quality (a strong business case that they produce value) in order to justify receiving ongoing payment through third-party payers. Common factors that can serve as both facilitators and barriers include the following:

- The awardee's ability to engage external stakeholders or payers
- The awardee's ability to engage internal stakeholders
- The program's alignment with state and federal policies

Prior experience with implementing the same or a similar program is another common facilitator. Program complexity and inadequate access to timely and good quality data (both from internal and external sources) present common challenges to SSR. Specifically, insufficient data limit the awardees' abilities to conduct the analyses necessary to develop payment models and prove positive program outcomes.

Many awardees will rely on results from the upcoming impact evaluation to gain ongoing support, yet awardees will likely not benefit from the impact estimates because their cooperative agreements end before the estimates become available and because early estimates have limited usefulness. Delays in enrollment and lags in data availability make it impossible to generate more timely impact estimates for enrollees with sufficient exposure to the interventions.

Evaluability assessments and enrollee characteristics at baseline

The updates to our initial evaluability assessment for each awardee show that we expect to be able to produce rigorous estimates for 23 of the 39 awardees (see Table ES.2). Sample sizes are adequate, and it will be feasible to construct credible comparison groups for the Medicare FFS beneficiaries of 15 awardees and for the Medicaid beneficiaries of 14 awardees (impacts can be evaluated for both Medicare and Medicaid beneficiaries for 6 awardees). This assessment of evaluability is based on current knowledge and critical assumptions related to enrollment, variance in outcomes, availability of Medicaid data, and comparison group matching, all of which may change.

Table ES.2. Awardees for which we are likely to be able to conduct a rigorous impact evaluation

Awardee group	Number of awardees	Rigorous impact analysis likely for Medicare enrollees	Rigorous impact analysis likely for Medicaid enrollees
Youth with complex conditions	4		NACHRI, SCH, UIC, WI DHS
High-risk chronic conditions	4	NM, **NYC H+H**, UHCMC, U KS	**NYC H+H**
Lower-risk chronic conditions	6	ACCF, **CCNC**, CHIIC, **FPHNY**, **Ventura**, **VillageCare**	CCNC, FPHNY, Ventura, VillageCare
Behavioral health and cognitive disorders	3	UCSF	Clifford Beers, Montefiore
Acute and sub-acute conditions	1	**Mesa**	**Mesa**
Primary and preventive care	5	AAMC, Avera, CCC	Altarum, Columbia

Notes: High risk is defined as having a precipitating inpatient or emergency department (ED) service that triggers enrollment into the program or having clinical conditions associated with a high risk of having inpatient or ED service use in the coming year. Bolded awardees indicate those we expect to conduct a rigorous impact analysis on, for both Medicare and Medicaid enrollees.

The pre-enrollment (baseline) characteristics of Medicare FFS beneficiaries for 27 awardees show that beneficiaries in nearly all programs are at substantially higher risk of incurring above-average costs during the program period. Compared with beneficiaries nationwide, program participants are more likely to have disability as the original reason for being entitled to

Medicare coverage and to be dually enrolled in Medicare and Medicaid. Average Medicare expenditures for participants in the year before enrollment were over 2.5 times the national average, and for 5 awardees, the average prior expenditures were 4 to 6 times the national average. We present pre-enrollment data for the Medicaid participants of 5 awardees as well, but given the diversity of this population, there was no single national benchmark against which these means could be meaningfully compared.

Next steps

During the third year of the evaluation (which covers the third and final year of the HCIA R2 cooperative agreements), we will focus on five key areas:

1. **Updating information and developing lessons learned about the awardees' service delivery models after they became fully operational and assessing the extent to which awardees reached their enrollment, staffing, and service delivery goals.**
2. **Updating information and developing lessons learned about the design and implementation of the awardees' payment models and of their broader strategies for sustaining, scaling, and replicating their programs after the end of the cooperative agreements.**
3. **Highlighting the reasons that some awardees failed to meet their implementation goals by the end of the cooperative agreements.**
4. **Describing the experiences of clinician staff, non-clinician staff, and patients with the program and their perceptions of the effect of the interventions on the delivery of care and health outcomes.** This analysis will be based on the non-clinician staff survey fielded in the fall of 2016 and on two new surveys: (1) a survey to be fielded in spring 2017 of 2,300 clinicians (across 18 awardees) who are implementing the interventions and (2) a survey to be fielded in summer 2017 of 7,800 patients (across 21 awardees) who receive services paid for by HCIA R2 funds. The clinician survey is being administered only to clinicians associated with awardees whose intervention is expected to affect clinician behavior. Similarly, the patient survey will be administered only to patients enrolled in awardee programs that are expected to influence patient experience, and that target a population for which a survey typically would not be overly burdensome.
5. **Preparing interim impact estimates for awardees with enough Medicare (or Medicaid) enrollees and for which a credible comparison group can be identified.** The interim sample of Medicare enrollees will include only those who enrolled in the awardees' programs through August 2016 (the first two years of HCIA R2 funding) so that all enrollees will have at least six months of exposure to the intervention and we will have data on outcomes for them as of February 2017. We will conduct a similar analysis for Medicaid enrollees.

The results of these Year 3 implementation, survey, and impact activities will be presented in the third annual evaluation report in January 2018.

I. INTRODUCTION

A. Background and purpose of the HCIA R2 awards

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2), to 39 organizations that have proposed innovative ways to improve the quality and lower the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. CMMI selected organizations whose goals were to (1) reduce Medicare, Medicaid, or CHIP costs in outpatient or post-acute settings; (2) improve care for patients with special needs; (3) test new financial and clinical models for specific provider types; and (4) improve the health of specific populations by enhancing patient engagement and improving disease prevention, wellness, and comprehensive care. In contrast to the first round of HCIA, CMS specifically sought new payment models to support the service delivery models funded by this initiative. Awardees are required to deliver, during or by the conclusion of the cooperative agreement, a detailed and fully developed version of the payment model, as well as a list of payers that are interested in testing the payment and service delivery model.

The 39 programs funded under HCIA R2 represent a wide range of service delivery and payment models, target populations, and care settings. In February 2015 (five months after the HCIA R2 cooperative agreements were awarded), CMMI selected Mathematica Policy Research and its partners to evaluate the HCIA R2 programs.

B. Evaluation goals and purpose of this report

The goals of this five-year evaluation are to assess whether and how the programs are transforming the delivery and financing of health care services, as well as how these changes are improving the coordination, cost, and quality of care. Our six evaluation objectives to help CMMI achieve these goals include:

1. **Describe the implementation experience of each awardee** and assess the barriers to and facilitators of their success in promoting change
2. **Assess the effects of each awardee's model** on beneficiary experience, the attitudes of clinical and non-clinical staff toward their work, and beneficiary and staff perceptions of the intervention's effects on processes and outcomes of care
3. **Assess the effects of each model on health care costs, utilization, and quality of care** by using the same methodologies and outcome measures where possible, plus additional outcome measures tailored to each award as appropriate
4. **Synthesize the findings from the implementation and program impact evaluations** of each awardee with input from key stakeholders in order to (1) identify what model components appear to be most critical to success and how the administrative, geographic, and organizational context influenced this success and (2) inform CMMI's decision making about the sustainability and scalability of each type of model

5. **Assess awardees' payment model designs and their experiences in developing and testing the models**, focusing not only on the challenges and the strategies used to address them but also on the extent to which the models achieved predicted changes in utilization, savings, and quality of care during the three-year cooperative agreement
6. **Conduct an integrated synthesis and meta-evaluation of the awardee-specific results**, drawing lessons that can be generalized across subgroups of similar awardees and to the entire portfolio of awardees

This report, the second of four annual evaluation reports we will submit to CMMI, addresses the first and fifth evaluation objectives (describing the implementation of the service delivery models and the development of the payment models) and lays the foundation for addressing the other objectives in future reports. The first annual report, which is publicly available and accessible on CMS's website at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf, highlighted the variation in awardee and program characteristics, synthesized the early implementation experiences of the 39 awardees, and assessed the evaluability of each program. This report, which covers the awardees' implementation experiences during the second program year (September 2015 to August 2016), has three general purposes:

1. **Highlight the changes in program features**, including the modifications that awardees made to their service delivery and payment models, as well as the steps taken to develop and implement their sustainability plans, during their second program year
2. **Synthesize the recent implementation experiences of the awardees** and the effectiveness with which they implemented their programs, as well as identify the barriers and facilitators that the awardees encountered during the second program year and the strategies that they used to address their challenges
3. **Begin the evaluation process** by updating our initial assessment of the evaluability of each program and examining the baseline characteristics of the Medicare (or Medicaid) beneficiaries served by the programs during the first 21 months of program operations

We based our analysis of program implementation on a review of the awardees' self-reports and telephone interviews with program administrators and frontline staff. Self-reports covered the fifth through the eighth program quarters (September 2015 to August 2016). The interviews were conducted at up to three implementing sites per awardee, from July through September 2016. We developed standardized interview protocols and tailored them to the details that are specific to each of the 39 programs. In addition, we used program enrollment data (through August 2016) that the awardees provided to the implementation and monitoring contractor to describe how the number of program participants to date compares to the awardees' third-year target levels. Our assessment of implementation progress is based on self-reported information; we were unable to independently verify the awardees' input.

Our baseline analysis for the impact evaluation is based on Medicare (and, for several awardees, Medicaid) enrollment and claims data for participants who were enrolled from program inception through May 31, 2016—that is, three months before the end of the second program year, which allowed for sufficient claims run-out.

C. Awardee groups

Based on our review of information compiled for the first annual report, we created the six mutually exclusive awardee groups listed below. The purpose of these groups is to facilitate the comparison of implementation experiences and impacts among awardees targeting similar patient populations and to highlight any differences between the groups. We used these groupings to guide our data collection and analysis activities during the past year and to organize our presentation of findings, including the findings in this report. The groups are defined on the basis of the health problems and age of each awardee's primary target population:

1. **Youth and young adults with chronic or complex medical conditions (five awardees).**
2. **Adults with chronic physical conditions—high risk of costly acute care utilization (eight awardees).** We defined high risk as meeting at least one of the following criteria: (1) the beneficiary has late-stage chronic disease or multiple chronic conditions that increase the risk of costly utilization in the next year, or (2) the beneficiary had at least one chronic condition and at least one emergency department (ED) visit, hospital admission, or hospital readmission during the year before enrolling in an HCIA R2 program.
3. **Adults with chronic physical conditions—lower risk (seven awardees).** Awardees in this group also target individuals with chronic conditions, some of whom may be at high risk, but being high risk is not a criterion for enrollment. One awardee in this group (Community Care of North Carolina) also serves some children with chronic conditions, but adults comprise the bulk of its enrollees.
4. **People (adults, young adults, or children) with behavioral health or cognitive disorders (five awardees).**
5. **Adults who are seeking or who recently received acute or sub-acute care (six awardees).** An acute or sub-acute episode of care usually, though not always, precipitates enrollment into the program. This group includes one awardee that also treats adolescents. Although some participants have chronic conditions, this is not a criterion for enrollment.
6. **People (adults, young adults, or children) who need primary or preventive care but who do not meet the criteria for any of the other groups (eight awardees).** Although this group of awardees does not require people to meet any of the above enrollment criteria, some participants might nonetheless have conditions such as behavioral health disorders or high-risk chronic conditions.

The six mutually exclusive groups of awardees are defined according to the *primary* target population of the awardee. As a result, an awardee in any given group may have individual enrollees who have other characteristics that are targeted by one or more of the other groups. For example, an awardee that targets young adults with complex medical conditions could include some participants who also have behavioral health or cognitive disorders. Table I.1 lists the awardees in each group.

Table I.1. List of HCIA R2 awardees by target population–based group

Group	Awardee
Youth with complex medical conditions	BMC, NACHRI, SCH, UIC, WI DHS
High-risk chronic conditions	DMC, FSCL, NM, Northwell, NYC H+H, UCSD, UHCMC, U KS
Lower-risk chronic conditions	ACCF, CCNC, CHIIC, FPHNY, GWU, Ventura, VillageCare
Behavioral health and cognitive disorders	Amerigroup, Clifford Beers, Hopkins, Montefiore, UCSF
Acute and sub-acute care	CCC, Icahn, Mesa, NHCHC, UMich, UNM
Primary and preventive care	AAMC, Altarum, Avera, CHS, Columbia, U NC, Wash U, Yale

In summarizing our findings, we first give an overall picture that cuts across the six groups for each of three substantive areas of implementation. The analysis also points out any major differences across the primary target populations as defined by the groups. We then briefly discuss examples and noteworthy variations across awardees within any given group.

D. Summary of findings from the first annual report

In the first annual report, we reported that all 39 awardees had launched at least some components of their programs by the end of the first year of their cooperative agreements and that many had modified their programs—sometimes in major ways—to better serve participants and achieve program goals, including enrollment targets.[2] Fifteen awardees implemented their programs on schedule (based on their own milestones), but 24 awardees experienced some type of delay. This led to the following distribution of program launch dates:

- September to December 2014, 16 awardees
- January to March 2015, 18 awardees
- April to May 2015, 5 awardees

Only 6 awardees had met or surpassed their first-year enrollment goals by the end of the first year of their cooperative agreements; the remaining 33 awardees made concerted efforts to find ways to increase enrollment.

Awardees' efforts to launch and operationalize their programs were facilitated by the presence of several factors, and, in some cases, hindered by their absence. Primary among them were (1) staff perceptions that the program changes offered advantages over the way care had traditionally been provided; (2) the ability to adapt interventions to overcome implementation challenges and better meet organizational, staff, and participant needs; and (3) experiences with similar prior or concurrent projects or previous relationships with partner practices and organizations. Awardees also encountered barriers to implementation, such as insufficient buy-in and participation from clinicians who are not employed by the awardees but who are responsible for referring patients or providing intervention services, difficulties with integrating health IT

[2] The first annual report is available on the CMS website at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

components into the existing systems of providers and implementing partners, and the unanticipated complexity of participants' needs and life circumstances.

Awardees made considerably less progress in developing their payment models by the end of the first year of their cooperative agreements. Many reported that they were waiting for administrative data from local payers and managed care plans, including Medicaid, to calibrate their models or waiting until they could demonstrate their programs' improved care and lowered costs, before trying to add specificity to their payment model proposals.

We also reported in the first annual report that we expected to be able to provide rigorous impact estimates for at least 15 awardees, and possibly as many as 26. Based on the limited information available at that time, we expected to have enough observations for 26 of the awardees to provide the statistical power needed to detect effects of the size that the awardees had anticipated for at least one of the four core measures. Of these 26 awardees, however, we were reasonably confident that we could construct a credible comparison group for only 15 of them. For the other 11 awardees expected to have adequate numbers of enrollees, we described potentially serious challenges to identifying a credible comparison group or to obtaining timely access to the data that we would need. For these enrollees, we noted that we were continuing to explore ways to overcome these concerns. For the 13 awardees that were likely to lack sufficient numbers of enrollees to support a strong impact analysis, we recommended tracking and reporting administrative data on outcomes wherever possible.

E. Summary of findings from this report

1. Program enrollment

All awardees made significant progress with enrollment during the second year of their cooperative agreements. One-third (13 awardees) were on pace to meet their three-year enrollment targets—which is defined as being near, at, or above two-thirds of their final goal for enrolling participants. Nonetheless, about two-thirds (23) of the awardees appear likely to have enough Medicare and/or Medicaid enrollees to support a credible evaluation. Awardees used a range of strategies to boost their enrollments in Year 2, including (1) increasing access to potential participants by expanding program service to new geographic areas or service locations or relaxing the program eligibility criteria, (2) investing additional resources in participant recruitment staff and efforts, and (3) reaching out to providers and partners and encouraging their engagement in the referral process.

2. Implementation of service delivery models

Most awardees had fully implemented their interventions by the end of the second year of their cooperative agreements. A few, however, were still struggling to implement important components of their service delivery models, particularly those related to health IT, such as setting up web portals for patients and developing clinical decision-support tools for providers. Although most awardees during the second year made relatively minor refinements to their models, a handful of awardees continued to make significant changes, such as replacing implementation partners or offering new services.

As the awardees' focus shifted from launching their innovative programs to improving program operations, they encountered new facilitators and barriers that affected their implementation efforts. Examples of these important factors for implementation success include (1) engaging external providers and community organizations to coordinate care and support services across multiple settings, (2) leveraging staff training and technical resources to retain staff and deliver high quality services, (3) fostering a positive team culture that contributes to staff satisfaction and facilitates the successful delivery of care, and (4) aligning program services with payers' priorities and reimbursement policies.

3. Development and implementation of payment models

Progress in developing and implementing innovative payment models to help pay for program services after the end of the cooperative agreements varied substantially across awardees. As previously noted, awardees are only required to submit a detailed version of their payment model and a list of interested payers. They are only expected to implement the model if feasible. Reflecting the limitations of this requirement, by the end of Year 2, only three awardees had either implemented a model or received CMS approval to implement a model. The majority of awardees are still developing or refining their proposed payment models. Three awardees made little progress or had not yet developed a proposal for a payment model during the second program year. Three factors were important drivers of progress in developing and implementing payment models during the second program year: (1) building or maintaining strong relationships with payers, (2) demonstrating to payers that program services will lower costs and improve outcomes, and (3) obtaining data from payers to calibrate payment rates. The last two factors were a challenge for most awardees.

4. Sustainability, scalability, and replicability plans

Most awardees have started working on ways to sustain their programs after their HCIA R2 funding ends. Understandably, sustainability, scalability, and replicability (SSR) planning and progress take a back seat to the more immediate need of many awardees to reach their enrollment target. The eight awardees lagging on sustainment planning tended to struggle with program implementation issues and low enrollment, which limited their ability to look to the future. Because scaling and replicating typically requires evidence that the model has reduced costs or improved patient outcomes, very few awardees have made efforts to actually scale or replicate their programs to date. Still, replicating is part of some awardees' sustainment plans because it can help generate more funding.

Significant barriers to SSR remain. Even awardees with relatively developed sustainment plans still face barriers and uncertainty about their program's future. Three common barriers to sustainment plans include (1) the inability to secure funding or gain support from internal leaders without adequate evidence to show that their program improves health outcomes and saves money; (2) the impact of potential changes in the policy environment that could derail parts or all of their program; (3) the program's complexity, especially related to large resource needs, managing and meeting partners' expectations, and IT systems that were difficult to integrate into existing electronic medical record (EMR) systems and workflows.

5. Evaluability assessments

We also updated our initial evaluability assessment for each awardee based on more complete information. We now expect to produce rigorous estimates for 23 of the 39 awardees. For 15 awardees, the number of enrolled Medicare fee-for-service (FFS) beneficiaries is adequate and it will be feasible to construct credible comparison groups for them. Fourteen awardees have enough Medicaid enrollees and credible comparison groups to support a rigorous evaluation (impacts can be evaluated for both Medicare and Medicaid beneficiaries for 6 awardees).

6. Baseline characteristics of program participants

Finally, we present the pre-enrollment (baseline) characteristics of Medicare beneficiaries for 27 awardees, and as expected, we found that beneficiaries in nearly all programs are at substantially higher risk of incurring above-average costs during the program period. On average, Medicare beneficiaries in these programs are substantially more likely than the Medicare FFS population nationwide to have disability as the original reason for being entitled to Medicare coverage and to be dually enrolled in Medicare and Medicaid. Across the 27 awardees, the average Medicare expenditures for participants in the year before enrollment were over 2.5 times the national average, and for 5 awardees, the average prior expenditures were 4 to 6 times the national average. In addition, the average Hierarchical Condition Category (HCC) scores for participants in all 27 programs were twice the national average in the year before enrollment. We present pre-enrollment data for the Medicaid participants of 5 awardees as well, but given the diversity of this population, there was no single national benchmark against which these means could be meaningfully compared.

F. Roadmap to the report

The remainder of this report presents the following:

- An updated overview of the HCIA R2 programs (Chapter II)
- Findings from our Year 2 implementation evaluation in four areas: (1) enrollment, (2) implementation of the service delivery models, (3) design and implementation of the payment models, and (4) sustainability plans (Chapter III)
- An update to our evaluability assessments and analysis of Medicare (and, for some awardees, Medicaid) claims for the year prior to enrollment (Chapter IV)
- Next steps in our implementation and impact evaluations, including SSR planning and the staff, clinician, and beneficiary surveys (Chapter V)

Appendix A describes the key evaluation challenges that remain with respect to the identification of credible comparison groups—the most significant challenge in the use of quasi-experimental designs for program evaluation. The appendix also describes our proposed strategies for addressing these challenges. Appendix B of this report provides 39 awardee-

specific narratives, which formed the bases for the implementation and impact syntheses in the main body of this report.[3]

[3] George Washington University voluntarily terminated its cooperative agreement with CMMI and withdrew from the HCIA R2 initiative effective September 1, 2016. As this report covers the second program year (September 1, 2015, to August 31, 2016) and George Washington University was in active status during this period, the awardee is included in the main body of the report and in Appendix B; however, it should be noted that George Washington University spent the last several months of the second program year in preparation for award closeout.

II. OVERVIEW OF HCIA R2 AWARDEES AND THEIR PROGRAMS

This chapter updates the variation in awardee programs on three dimensions: (1) target population, (2) service delivery model, and (3) payment model.[4] (We provide additional detail on the characteristics of the awardees and their programs in the individual awardee narratives in Appendix B.) As a part of their applications, HCIA R2 awardees were required to describe the target population they intended to serve and the specific services they intended to provide or the investments in the delivery of care that they intended to make. By the end of their three-year agreements, awardees are also required to have developed a comprehensive payment model for covering the cost of the newly rendered services under the program, as well as a list of payers or plans that are interested in testing the payment and service delivery models. However, most awardees modified their original programs—sometimes in significant ways—after becoming operational, in order to address their implementation challenges and better meet participants' needs. The information presented in this chapter reflects the characteristics of the programs at the end of the second program year. The progress that awardees have made in meeting their enrollment goals and implementing their service delivery and payment models and the factors influencing that progress are discussed in Chapter III.

A. Target population

As discussed in Chapter I, we have divided the populations targeted under the HCIA R2 initiative into six groups (see Table II.1). The six groups include children with complex needs (five awardees), high-risk adults with chronic conditions (eight awardees), lower-risk adults with chronic conditions (seven awardees), people with behavioral health or cognitive disorders (five awardees), adults with a precipitating acute or sub-acute care episode (six awardees), and people with primary or preventive health care needs (eight awardees).

We created these awardee groupings to facilitate comparisons by capturing what we consider to be the most salient characteristic of each program's target population. However, programs in different groups can share important characteristics that are likely to be associated with implementation experience and outcomes. For example, 24 awardees across all six groups target some patients with chronic conditions, 14 awardees across four groups target patients with precipitating acute or sub-acute care events, and 10 awardees across three groups target children or adolescents.

At the same time, programs within the same group can differ in important ways that may influence implementation success and program outcomes. For example, of the eight awardees targeting adults with high-risk chronic conditions, about half target participants with severe conditions such as late-stage chronic disease or a life-limiting illness. The other half target participants with one or more chronic conditions who also had an ED visit or hospital admission during the year before enrollment. Other targeting criteria that vary within the six groups include age, the particular chronic diagnoses, and the type of acute or preventive care needed. We will

[4] We describe a broader range of awardee and program characteristics in the first annual report. Here, we focus on characteristics that awardees were likely to have operationalized or modified during their second program year.

consider these and other target population characteristics when identifying presenting findings for subsets of awardees across and within the groups in future analyses.

Table II.1. Characteristics of HCIA R2 eligible populations, by awardee group

Awardee	Eligible population
Youth with complex medical conditions (five awardees)	
BMC	All children with medically complex conditions (defined as having high utilization in the year before referral or clinical assessment of being at risk of high utilization) who reside in Massachusetts
NACHRI	Children who are enrolled in Medicaid with a long-term chronic condition, complex chronic condition, or malignancy (as defined by 3M Clinical Risk Groups software categories 5b, 6, 7, 8, or 9 using billing or claims data) who reside in states with participating hospitals
SCH	Children who are enrolled in both Medicaid and the Supplemental Security Income program who are identified as being at high risk for negative health outcomes (defined as experiencing a hospitalization within the past six months or two ED visits in six months and a Washington State Predictive Risk Intelligence System score greater than 1) and who reside in King or Snohomish counties in Washington State
UIC	Children and young adults age 25 and younger who are enrolled in a Medicaid managed care plan or in Medicaid fee-for-service who have chronic medical conditions (defined as being diagnosed with diabetes, sickle cell disease, asthma, or prematurity) and who reside in Cook County, Illinois
WI DHS	Children who are enrolled in Medicaid or CHIP with complex medical conditions (defined by chronic conditions involving three or more organ systems that require ongoing care from three or more specialists) and fragility (defined as high tertiary center utilization) who reside in Wisconsin
High-risk chronic conditions (eight awardees)	
DMC	All individuals who are frequent users of the ED; who have no primary care physician on record; who have at least one of seven chronic conditions (defined as diabetes, asthma, hypertension, congestive heart failure, depression, chronic obstructive pulmonary disease, and HIV/AIDS); and who reside in Detroit, Michigan
FSCL	Adults over the age of 65 years old who are enrolled in Medicare fee-for-service, who have a life-limiting illness (usually with a prognosis of one year or less), and who reside in western North Carolina or the Greenville area of South Carolina
NM	Adults with type 2 diabetes who have been recently discharged from the hospital, are at high risk for readmission, and reside in medically underserved areas (defined by zip code) in the Omaha area of Nebraska
Northwell	Adults with a nonmilitary payer who have advanced chronic kidney disease (defined as stages 4 or 5) and who reside in one of four counties in the New York City area of New York
NYC H+H	All adults who visit an ED for an ambulatory care–sensitive condition or meet other utilization-based criteria (such as another recent ED visit or hospitalization) and who reside in New York City
UCSD	Individuals who are enrolled in Medicaid or Medicare or who are dually eligible; who are at high risk for a major adverse cardiovascular event (such as a heart attack, stroke, or sudden cardiac death); and who reside in San Diego, California
UHCMC	Adults who are enrolled in Medicare or Medicaid who are receiving care at Seidman Cancer Center for complex cancers (defined as stage 3 or 4 solid tumors, new disease progression, regionalized malignancies with complicating comorbidities, or other risk factors for poor outcomes and increased expenditures, or high acute service utilization) and who reside in Ohio
U KS	All residents who have been hospitalized for heart attack, stroke, or sepsis; who are at risk for heart attack or stroke or who have hypertension or hyperlipidemia; and who reside in Kansas

Table II.1. *(continued)*

Awardee	Eligible population
Lower-risk chronic conditions (seven awardees)	
ACCF	Individuals who are enrolled in Medicare or have private insurance, who have stable ischemic heart disease, and who reside in Florida or Wisconsin
CCNC	Individuals who are enrolled in Medicaid fee-for-service, Medicare, or CHIP or who are dually eligible who have one or more chronic medical conditions treated through medications filled at participating pharmacies in North Carolina
CHIIC	Adults enrolled in Medicare or Medicaid with one or more chronic diseases who seek care at one of the Mercy Health Network–affiliated clinics in rural areas in northern, central, or western Iowa and eastern Nebraska
FPHNY	Adults enrolled in Medicare or Medicaid who are infected with the hepatitis C virus and who reside in the Bronx or in the East or Central Harlem areas of New York City, New York
GWU	Adults who are eligible for Medicaid, Medicare, or the Healthcare Alliance Program; who are diagnosed with HIV, at risk of contracting HIV, or at risk for other sexually transmitted diseases; and who reside in the District of Columbia
Ventura	Individuals enrolled in Medicare or Medicaid who have chronic obstructive pulmonary disorder and who reside in Ventura County, California
VillageCare	Individuals age 18 and older who are enrolled in Medicare or Medicaid, who are diagnosed with and prescribed medication for HIV, and who reside in the New York City area in New York
Behavioral health and cognitive disorders (five awardees)	
Amerigroup	Youths between the ages of 17 and 20 who are enrolled in Medicaid and in foster care, have a documented history of behavioral health needs, and reside in participating counties in Georgia
Clifford Beers	Children enrolled in Medicaid with complex physical and behavioral health needs who reside in the New Haven area of Connecticut
Hopkins	Older adults (and their caregivers) who are dually enrolled in Medicaid and Medicare or in Medicare only; who have Alzheimer's disease or a related form of neurodegenerative dementia; and who reside in the Baltimore, Maryland area
Montefiore	Individuals with public or private health insurance who receive services from participating primary care sites and screen positive for depression, anxiety, or (for children and adolescents) attention deficit hyperactivity disorder and who reside in the Bronx area in New York City, New York
UCSF	Individuals age 45 or older (and their caregivers) who are enrolled in Medicare or Medicaid with a diagnosis of dementia who reside in California, Nebraska, or Iowa
Acute and sub-acute care (six awardees)	
CCC	Individuals who are enrolled in Medicare or Medicaid or who are dually enrolled, who have been admitted to a participating nursing facility as a transitional care unit patient, and who reside in Minnesota
Icahn	Individuals at least 18 years of age who are enrolled in Medicare fee-for-service, Medicaid managed care, or are dually eligible who present in Mount Sinai inpatient and outpatient settings and are discharged for acute and sub-acute rehabilitation at home and who reside in the Manhattan area of New York City, New York
Mesa	All individuals who call 911 with low-risk concerns and patients with congestive heart failure, chronic obstructive pulmonary disease, sepsis, or pneumonia who were recently discharged from Mountain Vista Medical Center and who were identified as high risk for readmission and who reside in Mesa or Apache Junction, Arizona

Table II.1. *(continued)*

Awardee	Eligible population
Acute and sub-acute care (six awardees)	
NHCHC	Individuals age 18 years or older who are enrolled in Medicare or Medicaid or who are dually enrolled; who are experiencing homelessness; who have an acute illness or injury; who are at high risk of hospitalization; and who reside in the vicinity of a participating respite care program in Arizona, Connecticut, Minnesota, Oregon, or Washington State
UMich	All individuals who are scheduled for a major abdominal or a select general surgery at participating surgical practices throughout Michigan who are at high risk for poor surgical outcomes
UNM	Adults enrolled in Medicare or Medicaid who present with a neuro-emergent condition at a participating ED in New Mexico
Primary and preventive care (eight awardees)	
AAMC	All individuals age 17 or older who visit participating primary care practices in California, the District of Columbia, Illinois, Iowa, New Hampshire, Virginia, or Wisconsin
Altarum	Individuals age 17 or younger who are enrolled in Medicaid or CHIP who seek care from participating primary care providers and who reside Michigan
Avera	All individuals who reside in participating skilled nursing facilities in Iowa, Minnesota, Nebraska, and South Dakota
CHS	All individuals who benefit from patient navigation or direct medical, dental, or behavioral health services who reside in Pine Hills, Florida
Columbia	Children ages 2 to 6 who are enrolled in Medicaid (plus up to two of their siblings and their caregivers); who have early childhood caries and no comorbidities; and who reside in New York City, New York
U NC	Individuals enrolled in Medicare and Medicaid who visit a participating outpatient primary or specialty care provider for acute non-specific lower back pain and who have not seen a provider for back pain in the previous six months, who reside in a seven-county region in North Carolina
Wash U	All women ages 14 and older who are at high risk for unintended pregnancy and childbirth and who reside in the St. Louis area of Missouri
Yale	All individuals who are living at home and have fallen or who are at risk of falling who reside in the emergency medical services geographic catchment area in Greater New Haven, Connecticut

Source: Discussions with awardee and program staff during site visits, July–September 2016; review of awardees' self-reported eighth-quarter program narratives, through August 31, 2016.

CHIP = Children's Health Insurance Program; ED = emergency department.

B. Service delivery model

The 39 HCIA R2 awardees are implementing a broad range of service delivery models, all of which are designed to improve care and lower costs. In some cases, awardees directly provide previously uncovered patient care services. In other cases, awardees expect to affect patients indirectly through broader practice transformation strategies. We developed a list of 16 major components that we observed across the 39 programs, and then grouped them into three broad direct care service categories (care coordination and care management, patient counseling and

education, and other direct care services) and one practice transformation category.[5] The majority of the HCIA R2–funded service delivery models consist of more than one component, including both direct patient services and broader practice transformation components. A breakdown of intervention components by awardee is shown in Table II.2 (found on page 18). The awardees' intervention components are discussed in detail in the individual awardee narratives in Appendix B.

The sheer wide range in the mix of components underscores the diversity that is characteristic of the HCIA R2 programs overall. This section describes these components. Chapter III explains how the awardees have implemented their service delivery models in Year 2, along with the challenges they have faced and the facilitators and strategies that have helped them in the process.

Most of the programs involve the direct provision of intervention services to targeted patients and, in some cases, their caregivers as well. The most common of the direct care service components in the HCIA R2 portfolio of awards relate to care management and care coordination (31 awardees). This includes care management, outpatient care coordination, transitional care, and the integration of behavioral and medical care. Though different, care management and care coordination are often closely linked in practice. However, an intervention may focus on improving enrollees' and families' self-management (care management), yet do little or nothing to improve communication among multiple providers treating the patient. Conversely, an intervention may emphasize coordinating across the different providers (outpatient care coordination) while paying less attention to enrollees' and caregivers' self-management knowledge and behaviors. Another intervention may focus both on self-management skills and on synchronizing the efforts of the various treating providers. Awardees are commonly implementing more than one of the four components in this group.

- **Care management and self-care** (21 awardees) helps patients and their caregivers manage their medical or mental health conditions. It typically encompasses referral and transition management as well as specific services such as patient monitoring, self-management support, and medication review and adjustment. For example, the Regents of the University of California at San Diego is attempting to lower patients' risk of a major cardiovascular event by raising participants' awareness of cardiovascular risk factors, discussing evidence-based medications, and providing supportive and ongoing health coaching.
- **Care coordination** (14 awardees) organizes care across several providers or during care transitions. Care coordinators typically try to ensure that the test results and treatment plans of specialists and primary care providers who are treating a given patient are shared among all of the providers. They also link patients with community resources, help providers communicate and work together to address patients' physical and cognitive problems in a unified manner, and follow up with patients after an ED visit or hospital discharge. For

[5] In many cases, we have distinguished between program components to better describe what comprises the actual intervention. From the awardees' perspective, however, the components are often viewed as a unit, not independent pieces, working together to achieve program goals.

example, Boston Medical Center uses meetings of multidisciplinary care teams to help children with complex needs and their families by developing a comprehensive care plan; providing referrals to social, educational, behavioral, and medical services; and facilitating ongoing communication among a patient's primary care physicians, specialists, and other nonmedical services.

- **Transitional care** (8 awardees) is a specific type of care coordination provided to patients following their discharge from an ED, hospital, or skilled nursing facility (SNF). The purpose of transitional care is to ensure that care is seamless across providers and during care transitions. For example, the Wisconsin Department of Health Services program uses a care coordination team to ensure smooth transitions of care between hospital units or from hospital to home. The team accomplishes this by ensuring that follow-up appointments occur in a timely manner; by facilitating communication across specialists, primary care physicians, and special needs plan providers; and by addressing psychosocial, emotional, and socioeconomic issues that affect access and adherence to care.
- **Integration of behavioral and medical care** (2 awardees) refers to a team of primary care and behavioral health clinicians working together to provide care to "address conditions such as mental health and substance abuse conditions, health behaviors (including their contribution to chronic medical illnesses), life stressors and crises, stress-related physical symptoms, and ineffective patterns of health care utilization."[6] For example, Montefiore Medical Center has integrated behavioral health care into primary care settings through a collaborative care model. Under this model, all patients who visit primary care practices complete a self-administered screening tool in which they identify behavioral health symptoms. Primary care providers connect individuals who screen positive for one of the program's targeted conditions to a member of the site's behavioral health team. A psychiatrist consults with the primary care providers to support the management of participants' psychiatric medications and with the behavioral health team to help identify participants' needs for behavioral health services. Participants may take advantage of short-term psychotherapy with the licensed clinical social worker, psychiatric medication management with the psychiatrist, or telephone outreach from the behavioral health patient educator.

Although occurring in all groups, both care management and care coordination are particularly common among awardees targeting children with complex needs, adults with high-risk chronic conditions, and people with behavioral health or cognitive disorders.

The second most common type of direct care service intervention relates to counseling and health education provided to patients and their families or caregivers (29 awardees), which includes patient and family engagement, patient education and training, shared decision making, and patient navigation of the health care system. Patient counseling and education is used by all

[6] Peek, C.J., and the National Integration Academy Council. "Lexicon for Behavioral Health and Primary Care Integration: Concepts and Definitions Developed by Expert Consensus." AHRQ Publication No. 13-IP001-EF. Rockville, MD: Agency for Healthcare Research and Quality, 2013. Available at http://integrationacademy.ahrq.gov/sites/default/files/Lexicon.pdf.

of the awardees that are targeting youth with complex needs and the majority of awardees in each of the other five groups. Awardees are commonly implementing more than one of the components in this group.

- **Patient and family engagement** (22 awardees across all groups) refers to engaging and empowering patients and families to manage their (or a family member's) health conditions and help them make their own healthy living goals. This can include formal self-management support programs, patient and caregiver education or training, and offering incentives. For example, the Altarum Institute has undertaken efforts to empower families to take an active role in improving their children's oral health.
- **Patient education and training** (12 awardees, mainly in the complex and chronic medical and mental health groups) includes the use of staff, other individuals (such as peers and lay providers), or written materials to help patients and families become engaged partners in managing their health, using health care services, navigating the health care system, and accessing support services. This commonly involves using motivational interviewing and readiness-to-change assessment techniques to help patients overcome barriers to adherence. For example, the Village Center for Care developed a mobile application with appointment and medication reminders, discussion boards, private messaging, friend requests, a library of self-help articles, live chat with health coaches, and a searchable database of community social services and supports.
- **Shared decision making** (5 awardees, present in all but the youth and behavioral health groups) is an approach to care that seeks to fully inform patients about the risks and benefits of available treatments and engage them in decisions about their treatment.[7] To this end, patients may receive decision aids that support decision making by providing information about treatment or screening options and their associated outcomes, compared to usual care or alternative interventions. For example, the American College of Cardiology Foundation is using written materials and an interactive DVD about managing stable ischemic heart disease to better prepare patients for discussing treatment options with their physicians.
- **Patient navigation** (3 awardees in the behavioral health and primary care groups) refers to the use of staff or other individuals who provide personalized (patient-centered) guidance to patients as they move through the health care system. These services are less intensive than care coordination and usually less integrated with the providers themselves. For example, the Children's Home Society of Florida uses patient navigators to connect participants with a variety of health and social services, including housing supports, employment supports, food pantries, child care, and health insurance.

Other types of direct care service interventions implemented under HCIA R2 include expanded medical and dental services (10 awardees, mainly in the acute and primary care groups); telemedicine (8 awardees, spanning all six groups); medication therapy management

[7] Veroff, D., A. Marr, and D.E. Wennberg. "Enhanced Support for Shared Decision Making Reduced Costs of Care for Patients with Preference-Sensitive Conditions." *Health Affairs,* vol. 32, no. 2, February 2013. Available at http://content.healthaffairs.org/content/32/2/285.full.html.

services (5 awardees, in the chronic condition and behavioral health groups); in-home care (6 awardees, in the behavioral health, high-risk chronic condition, and acute care groups); and patient-centered care (5 awardees, in the two chronic condition groups).

- An example of an **expanded medical and dental service** intervention is the program by the Trustees of Columbia University in the City of New York, which is providing dental services not covered under traditional Medicaid. The program aims to prevent the progression of early childhood caries by assessing a child's risk for early childhood caries; teaching parents about the risk of caries; setting family goals and monitoring progress toward those goals; and providing social support, toothbrushes, and toothpaste.
- **Telemedicine** services allow providers, or patients and their providers, to engage in two-way, real-time communication across geographic areas. Interactive telecommunications equipment enables the interaction and includes, at a minimum, audio and video equipment. For example, the University of New Mexico's Health Sciences Center uses mobile carts equipped with video monitors and eye scanners to provide tele-health consultations to participating rural hospitals in New Mexico to treat patients with neuro-emergent conditions when they present in the emergency department of a local hospital. Avera Health relies on direct two-way audio and video technology to provide tele-health consults for urgent or specialty care for participants in 30 participating long-term care facilities.
- **Medication therapy management services** include medication reconciliation and support for adherence to medication prescriptions. For example, Community Care of North Carolina uses pharmacists to provide medication reconciliation to patients with chronic medical conditions, make referrals for behavioral and mental health services or home and community-based services, and support patients' self-management and informed decision making.
- An example of an **in-home direct care** service intervention is the program by Yale University. The awardee is providing in-home care to individuals who have recently fallen or who are at risk of falling. The awardee sends paramedics to participants' homes to conduct fall risk assessments and provide preventive care and increased linkages to primary care through a paramedic and a partnering visiting nurse agency.
- Detroit Medical Center is encouraging frequent users of the ED to seek care in one of its newly establish Gateway centers, which the awardee hopes will provide **patient-centered care** and function as a patient-centered medical home (PCMH).

Finally, about two-thirds (25) of the awardees (from all six groups) are implementing programs designed to improve the way in which care is delivered through **broader practice transformation** strategies, either solely or in combination with direct service interventions.

- Over half (21) of all awardees are implementing a **health information technology** (health IT) component, almost always in combination with the provision of care management or care coordination services. These activities typically involve the development, deployment, or enhancement of health IT systems and platforms to improve the efficiency of care delivery, the quality of care, and patient safety. For example, the American College of Cardiology is using health IT to (1) provide clinical decision support to cardiologists and other clinical specialists for managing stable ischemic heart disease at the point of care, (2) support patient-clinician shared decision making, and (3) enable the use of clinical registries to track and improve care. The use of health IT to improve the delivery of care is particularly common among awardees in the lower-risk chronic conditions, behavioral health, acute care, and primary care groups.
- Other activities to improve the delivery of health care services include using data to drive **quality improvement and practice workflow processes** (7 awardees) and providing tools and incentives for clinicians to **adhere to clinical guidelines** (6 awardees). For example, to ensure ongoing quality improvement among participating hospitals and affiliated clinics, Catholic Health Initiatives Iowa Corp., DBA Mercy Medical Center–Des Moines, uses performance excellence facilitators, who follow Lean process improvement approaches to identify areas in which operations can be improved and costs can be lowered. The facilitators meet with hospital administrators to present their ideas and obtain buy-in, work on standardizing care processes across the network, and help clinics receive PCMH certification. The University of North Carolina at Chapel Hill, on the other hand, has embedded a checklist into its EMR to encourage provider adherence to evidence-based guidelines for treating acute low back pain. Three of the six awardees pursuing greater adherence to clinical guidelines as a practice transformation strategy are in the primary and preventive care group.

C. Payment model

As a condition of participation, awardees are required to develop a payment model for covering the cost of intervention services after the end of program funding, as well as provide a list of payers or plans that are interested in testing the payment and service delivery models. The payment model refers to the manner in which Medicare, Medicaid, or CHIP pays providers in order to incentivize them to deliver efficient, high quality care. Specifically, by payment model, we mean a detailed payment strategy that public (and, ideally, commercial payers) can use to reimburse providers for the cost of services currently being delivered with HCIA R2 funds. Awardees are also encouraged to propose models that rely on new, alternative approaches rather than simply expanding or supplementing FFS payments.

Table II.2. Summary of major components of HCIA R2 service delivery models, by group

Awardees	Care management and care coordination				Counseling and health education				Other direct care services					Practice transformation activities		
	Care management	Outpatient care coordination	Transitional care	Integration of behavioral and medical care	Patient and family engagement	Patient education and training	Shared decision making	Patient navigation	Expanded medical and dental services	Telemedicine	In-home care	Medication therapy management	Patient-centered care	Health IT	Quality improvement and process redesign	Evidence-based, clinical practice guidelines
Youth with complex medical conditions																
BMC	X	X			X				X					X		
NACHRI	X	X			X	X									X	
SCH	X	X			X											
UIC	X	X			X	X				X				X		
WI DHS	X	X	X		X				X							
High-risk chronic conditions																
DMC	X	X				X							X			
FSCL			X		X					X			X			
NM	X				X					X	X			X		
Northwell	X	X			X	X	X					X	X			
NYC H+H	X		X													
UCSD	X					X						X				X
UHCMC	X								X			X		X		
U KS	X		X		X					X	X			X		X
Lower-risk chronic conditions																
ACCF						X	X							X	X	X
CCNC		X										X		X	X	
CHIIC	X	X				X								X	X	
FPHNY		X								X						
GWU	X				X									X		
Ventura	X												X			
VillageCare					X									X		
Behavioral health and cognitive disorders																
Amerigroup	X	X			X	X					X					
Clifford Beers	X			X	X	X					X			X		
Hopkins	X				X	X					X			X		
Montefiore				X						X				X		
UCSF		X			X			X				X		X		
Acute and sub-acute care																
CCC			X		X	X									X	

Table II.2. *(continued)*

Awardees	Care management and care coordination				Counseling and health education				Other direct care services					Practice transformation activities		
	Care management	Outpatient care coordination	Transitional care	Integration of behavioral and medical care	Patient and family engagement	Patient education and training	Shared decision making	Patient navigation	Expanded medical and dental services	Telemedicine	In-home care	Medication therapy management	Patient-centered care	Health IT	Quality improvement and process redesign	Evidence-based, clinical practice guidelines
Icahn		X			X		X		X		X			X		
Mesa			X				X		X							
NHCHC	X		X		X				X							
UMich					X									X	X	
UNM									X	X				X		
Primary and preventive care																
AAMC		X												X		X
Altarum					X				X					X		X
Avera			X							X					X	
CHS								X	X							
Columbia					X	X								X		
U NC	X						X							X		X
Wash U					X			X	X							
Yale	X															
Total	**21**	**14**	**8**	**2**	**22**	**12**	**5**	**3**	**10**	**8**	**6**	**5**	**4**	**21**	**7**	**6**

Source: Discussions with awardee and program staff during site visits, July–September 2016; review of awardees' self-reported eighth-quarter program narratives, through August 31, 2016

Note: Most awardee service delivery models include multiple components that fall into several categories.

Payment models are a part of the broader activities associated with program SSR, which we discuss in Section III.D of this report. Programs can be sustained in many ways that do not involve new forms of third-party reimbursement, including internal operating budgets, external grant funding, and the new chronic care management (CCM) and transitional care management (TCM) billing codes that Medicare began using in 2015. Each of these strategies has been considered by one or more awardees, but we do not consider any of these to represent a payment model per se. In addition, several awardees are using their HCIA R2 funds to offer incentive payments to participating providers (often tied to performance). Although these payments may provide the basis for a future payment model, we focused the data collection and analysis for this report on awardees' proposed plans for securing reimbursement for intervention services from public and private payers.

Given the timing of data collection for this report (the end of the second year of program operations), it is not surprising that relatively few awardees have put forth detailed payment model proposals or that even fewer have taken concrete steps to implement their plans (for example, securing contracts with public or private payers). In addition to a general lack of specificity, several other issues complicate our analysis. First, several awardees (such as the Detroit Medical Center and New York City Health + Hospitals) are considering using different models based on the needs and desires of the multiple payers with whom they are negotiating. Second, a few awardees (such as the National Association of Children's Hospitals and Related Institutions) are allowing participating sites to develop their own payment models and to negotiate independently with local payers or plans. Third, some models (such as Catholic Health Initiatives and the University of Kansas Hospital Authority) involve multiple levels of payment—such as when a managed care plan contracts with an accountable care organization (ACO), which in turn contracts with a medical practice group, which in turn contracts with individual providers. In these cases, each payment tier can be structured differently.

Table II.3 describes the 22 awardees that, based on discussions with awardee staff and a review of their eighth-quarter payment model report, have articulated payment model proposals with sufficient detail to enable us to summarize them in this report. (Two awardees—the National Association of Children's Hospitals and the National Health Care for the Homeless Council—are each proposing two different payment models, for a total of 24 models characterized in Table II.3.) Usually, this means describing the type of base payments used to cover the cost of intervention services (such as enhanced FFS or a lump sum per beneficiary per month [PBPM] payment amount), plus any additional features they propose including in the model (for example, linking payment to performance, sharing savings, or imposing risk on providers). We have divided these 24 proposals (across 22 awardees) into five mutually exclusive base payment approaches and identified up to three possible additional features. In the remainder of this section, we provide an overview of these awardees' proposed payment models. Their progress in implementing these proposals is discussed in Chapter III.

Table II.3. Characteristics of proposed payment models for HCIA R2 services

Awardee	Base payment approach					Additional features of payment model		
	PBPM payment	Bundled or episode payment	Enhanced FFS payment	Shared savings alone	Capitated or other payment	Links payment to performance	Offers shared savings	Imposes risk on providers
Youth with complex medical conditions (five of five awardees)								
BMC	X							
NACHRI 1	X							
NACHRI 2				X				
SCH	X					X	X	
UIC	X							
WI DHS			X					
High-risk chronic conditions (four of eight awardees)								
FSCL		X						
NM		X					X	
Northwell	X					X		
U KS				X			X	
Lower-risk chronic conditions (four of seven awardees)								
ACCF		X				X	X	
VillageCare	X							
CHIIC				X			X	
CCNC	X					X	X	X
Behavioral health and cognitive disorders (two of five awardees)								
Hopkins					X		X	
Montefiore	X					X		
Acute and sub-acute care (three of six awardees)								
Icahn		X				X	X	
Mesa			X				X	
NHCHC 1			X					
NHCHC 2		X				X	X	
Primary and preventive care (four of eight awardees)								
Wash U		X						
Yale	X							
Avera					X			
CHS	X					X	X	
Total	**10**	**6**	**3**	**3**	**2**	**8**	**11**	**1**

Source: Discussions with awardee and program staff during site visits, July–September 2016; review of awardees' eighth-quarter program documents, June–August 2016

Note: Table includes only those awardees with sufficient detail to characterize their proposed payment models. Inclusion in the table does not necessarily reflect progress made in implementing the proposed model. Two awardees (NHCHC and NACHRI) have two entries because different sites are proposing different models.

FFS = fee-for-service; PBPM = per beneficiary per month.

PBPM payment model. At the end of the second year of HCIA R2 implementation, the most common base payment approach among awardees with enough information to characterize their models was PBPM payment (Table II.3). We defined PBPM payment as a monthly payment from a payer to a provider for each participant enrolled in the intervention. At least 10 of the included awardees were using this approach. Half of the 10 awardees were proposing or implementing a PBPM payment amount with no additional features. The other half plan to use PBPM payments while linking payment to performance. Three of these awardees also included a shared savings option. For example, two sites funded by the National Association of Children's Hospitals got their state Medicaid agencies to agree to pay a fixed PBPM fee to support programs that coordinate and manage care for children with medical complexity. Similarly, Community Care of North Carolina is also providing community pharmacies with a PBPM fee for participating in the program. However, the awardee has proposed adjusting the payment amount based on a number of quality metrics, with two-sided risk to providers based on how well they perform relative to their peer group. The Children's Home Society and Seattle Children's Hospital are also negotiating a PBPM payment arrangement with shared savings with their Medicaid managed care plans. Most of the awardees that are using PBPM are targeting youths and adults with chronic or complex medical conditions, which is consistent with their focus on ongoing care management.

Bundled or per episode payment model. We defined bundled or episode-based payment as approaches that pay for a set of services for a specific period of time, beginning with a precipitating event. At least six awardees were developing or using this base payment approach; half of them included pay for performance, shared savings, or both. For example, Nebraska Medicine is proposing a model that will include payment for a set of follow-up tele-health services for individuals with type 2 diabetes who are discharged home from the hospital. In this model, the payer will reimburse the hospital a set amount per patient for one episode of services provided by the whole remote patient monitoring team—including, primary care physicians, nurses, medical assistants, dietitians, ophthalmologists, and other staff—rather than paying for each individual service. Given its goal of preventing ED visits and readmissions, the awardee is hoping to include shared savings options with Medicaid and local private payers as well. None of the awardees that are focused on youth and young adults with chronic or complex medical conditions or on individuals with behavioral health or cognitive disorders were using this approach.

Enhanced FFS payment model. Three awardees (all targeting Medicaid enrollees) reported trying to get their state Medicaid agencies or other local payers to provide enhancements to the existing FFS rates to offset the additional costs of their nonbillable services. For example, the City of Mesa Fire and Medical Department is working with local Medicaid plans and other payers to develop a fee structure for its community medicine services (medical unit 911 responses and post-hospital care transitions). The awardee is also trying to get certified as a network provider and is in discussions with local providers to set up shared savings agreements with them. National Health Care for the Homeless encouraged its five participating sites to set up their own payment models, which vary by payer. Three of these sites receive payments for primary care encounters and respite care services through an enhanced FFS rate from the state Medicaid agency—two through their affiliated federally qualified health centers and one through

a contract with a visiting nurse program. Because of early difficulties determining the cost of care coordination and the associated risk to participating hospitals if costs were not fully captured, the Wisconsin Department of Health Services dropped its original PBPM plan and created a new FFS payment billing code for care coordination services for Medicaid enrollees.

Stand-alone shared savings model. Three awardees included in our analysis were pursuing a stand-alone shared savings plan (with adjustments for performance) as their base payment approach. Stand-alone shared savings plans (such as ACOs) generally do not involve direct reimbursement for intervention services, but rather allow providers to share in any savings in total cost of care (compared with a benchmark for an attributed population), which accrues to payers or plans. For example, the University of Kansas and Catholic Health Initiatives, which are both offering rural health programs, are pursuing participation in the Medicare Shared Savings Program as a way of generating revenue to support their interventions. In both cases, the network providers would create (or join an existing) ACO, which would in turn contract with a payer or plan. Any surplus realized by the ACO would be shared with the provider group. Similarly, a National Association of Children's Hospitals site reached an agreement with a Medicaid managed care plan to share savings with the children's hospital and an affiliated network of primary care practices.

Capitated or other payment model. Finally, two awardees proposed capitated payments as a way of covering the cost of intervention services. Under capitation, providers receive a set amount for each enrollee assigned to them, per period of time, whether or not that person seeks care. Johns Hopkins University intends to cover the cost of in-home care to beneficiaries with Alzheimer's disease or dementia through two capitated payments, one for the memory care coordinators (who assess and manage patient needs) and another for the clinical team (that provides medical and mental health care to the patient). The payments are monthly for each enrollee, regardless of the services received. The capitated payments will be risk adjusted to account for a participant's need for services. The awardee also plans to establish a shared savings plan in which the payer offers home health agencies the opportunity to share the savings that accrue as a result of the program. Avera is also considering a form of capitation, which would be based on a retail subscription fee that participating SNFs would pay to use its telemedicine services for a specified period, such as each month or quarter. Avera will base the fee on the number of residents in the facility for the month, but will not charge per tele-health consult because the awardee does not want to discourage its use.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

During the second year of the evaluation, we focused on four aspects of implementation: (1) program enrollment, (2) implementation of the service delivery models, (3) development and implementation of the payment models, and (4) sustainability plans. Most awardees made significant progress meeting their service delivery goals, but more than half continued to struggle with enrollment and most have only recently started creating detailed payment models or plans for sustaining their programs after the end of their cooperative agreements (see Table III.1). For each of these areas, we describe the awardees' progress in meeting their implementation goals and the factors influencing their ability to meet these goals.

Table III.1. Awardee progress meeting implementation goals at end of Year 2

Acronym/ abbreviation	Awardee	Enroll-ment	Service delivery	Payment model	Sustain-ability
Youth and young adults with chronic or complex physical conditions (5 awardees)					
BMC	Boston Medical Center	O	X	O	O
NACHRI	National Association of Children's Hospitals and Related Institutions	X	X	O	X
SCH	Seattle Children's Hospital	X	X	O	X
UIC	The Board of Trustees of the University of Illinois	X	X	O	X
WI DHS	Wisconsin Department of Health Services		X	O	O
Adults with chronic conditions—high risk (8 awardees)					
DMC	Detroit Medical Center, Vanguard Health Systems		X		O
FSCL	Four Seasons Compassion for Life		X	O	O
NMC	The Nebraska Medical Center		X	O	O
Northwell	Northwell Health	X	X	O	O
NYC H+H	New York City Health and Hospitals Corporation	O	X		X
U KS	University of Kansas Hospital Authority		X	X	X
UCSD	Regents of the University of California San Diego	X	X	O	
UHCMC	University Hospitals Cleveland Medical Center	X	X	O	
Adults with chronic conditions—lower risk (7 awardees)					
ACCF	American College Of Cardiology Foundation	O		O	O
CCNC	Community Care of North Carolina	X	X	O	O
CHIIC	Catholic Health Initiatives Iowa Corp.	X	X	O	X
FPHNY	Fund for Public Health in New York, Inc.	X	X	O	O
GWU	George Washington University				
Ventura	Ventura County Health Care Agency	X	X	X	X
VillageCare	Village Center for Care	X	X	O	O
People (adults, young adults, or children) with behavioral health or cognitive disorders (5 awardees)					
Amerigroup	Amerigroup	O	X		
Clifford Beers	Clifford W. Beers Guidance Clinic, Inc.	O	X		O
Hopkins	Johns Hopkins University	X	X	O	O
Montefiore	Montefiore Medical Center	X	X	O	X
UCSF	Regents of the University of California, San Francisco	O	X	O	O

Table III.1 *(continued)*

Acronym/ abbreviation	Awardee	Enroll-ment	Service delivery	Payment model	Sustain-ability
Adults who are seeking or who recently received acute or sub-acute care (6 awardees)					
CCC	CareChoice Cooperative	O	X		O
Icahn	Icahn School of Medicine at Mount Sinai		X	O	O
Mesa	City of Mesa Fire and Medical Department	O		O	X
NHCHC	National Health Care for the Homeless Council		X	X	O
UMich	Regents of the University of Michigan				X
UNM	University of New Mexico, Health Sciences Center				O
People (adults, young adults, or children) who need primary or preventive care (8 awardees)					
AAMC	Association of American Medical Colleges	O	X		X
Altarum	Altarum Institute				O
Avera	Avera Health	O	X	O	X
CHS	Children's Home Society of Florida	O	X	O	
Columbia	Trustees of Columbia University in the City of New York	O	X		
U NC	The University of North Carolina at Chapel Hill				
Wash U	Washington University School of Medicine in St. Louis			O	X
Yale	Yale University		X	O	

Notes: For enrollment, an X indicates awardee is at or above two-thirds of its final enrollment goal, and an O indicates awardee is between one-half and two-thirds of its three-year target. For service delivery, an X indicates awardee has implemented its model largely according to plan, including engaging partners and providing the expected level of services. For payment model, an X indicates awardee has implemented or received CMS approval to implement a model, and an O indicates awardee has begun to develop a defined payment model. For sustainability, an X indicates awardee has begun implementing strategies for sustainment, and an O indicates awardee is actively pursuing strategies for sustaining its program.

A. Program enrollment

1. Progress meeting enrollment goals

More than two-thirds (27) of the 39 awardees reported that they had enrolled over 1,000 individuals during the first two program years, but most fell short of their self-imposed target.[8] Only one-third (13) of the awardees were on pace to meet their three-year enrollment target, which we defined as being near, at, or above two-thirds of their final enrollment goal (Table III.2). The remaining 26 awardees were at risk of not meeting their enrollment goal at the end of Year 2. Most of these awardees focused on increasing program enrollment during their second program year, but many continue to experience major challenges with meeting their target as they enter the third and final year of their cooperative agreement.

Table III.2. Participants served through August 31, 2016, and percentage of three-year target met, by awardee group

Awardee group	Enrollment approach	Type of participant	Target enrollment through Year 3	Number of participants served from program inception through Year 2	Percentage of three-year target met through Year 2
Youth with complex conditions: Three awardees have exceeded two-thirds of their three-year enrollment target.					
BMC	Active	Direct	450	266	59.1
NACHRI	**Passive**	**Indirect**	**8,064**	**7,424**	**92.1**
SCH	***Passive***	***Direct***	***960***	***644***	***67.1***
UIC[a]	**Passive**	**Direct**	**4,000**	**10,221**	**255.5**
WI DHS[b]	Active	Direct	1,317	634	48.1
High-risk chronic conditions: Three awardees have exceeded two-thirds of their thee-year enrollment target.					
DMC[c]	*Active*	*Direct*	*11,525*	*3,447*	*29.9*
FSCL	Passive	Indirect	8,000	2,776	34.7
NM	Active	Direct	3,300	1,302	39.5
Northwell	***Active***	***Direct***	***300***	***395***	***131.7***
NYC H+H	Active	Direct	107,646	61,025	56.7
UCSD	**Active**	**Direct**	**3,600**	**3,304**	**91.8**
UHCMC	**Active**	**Direct**	**1,503**	**1,009**	**67.1**
U KS	Passive and active	Indirect	10,811	5,344	49.4

[8] It should be emphasized, however, that the self-reported participation counts in awardees' quarterly reports to the implementation and monitoring contractor (which include all participants regardless of payer) differ from the number of eligible Medicare and Medicaid beneficiaries listed in the awardees' finder files and upon which most impact analyses will be based. For the impact analyses, we apply certain restrictions, such as a minimum of six months of enrollment in Medicare FFS or Medicaid. Furthermore, in some cases, we require the confirmation in claims data of an event, diagnosis, or procedure that triggers enrollment. See Chapter IV for further requirements for conducting a rigorous analysis and the specific awardees for which that appears to be possible.

Table III.2. *(continued)*

Awardee group	Enrollment approach	Type of participant	Target enrollment through Year 3	Number of participants served from program inception through Year 2	Percentage of three-year target met through Year 2
Lower-risk chronic conditions: Five awardees have exceeded or are close to exceeding two-thirds of their three-year enrollment target.					
ACCF	Passive	Indirect	25,557	14,018	54.8
CCNC[d]	***Passive and active***	***Direct***	***110,732***	***247,926***	***223.9***
CHIIC	***Active***	***Direct***	***10,000***	***11,617***	***116.2***
FPHNY	**Active**	**Direct**	**3,200**	**2,200**	**68.8**
GWU	Active	Direct	16,121	4,171	25.9
Ventura	**Active**	**Direct**	**2,500**	**1,655**	**66.2**
VillageCare	**Active**	**Direct**	**5,036**	**3,731**	**74.1**
Behavioral health and cognitive disorders: Two awardees have exceeded two-thirds of their three-year enrollment target.					
Amerigroup	Active	Indirect	720	415	57.6
Clifford Beers	Active	Direct	2,284	1,335	58.5
Hopkins	**Active**	**Direct**	**300**	**322**	**107.3**
Montefiore	***Passive***	***Direct***	***4,500***	***3,974***	***88.3***
UCSF	Active	Direct	700	405	57.9
Acute and sub-acute care: One awardee is close to exceeding two-thirds of its three-year enrollment target.					
CCC	Passive	Direct	8,874	5,803	65.4
Icahn	Active	Direct	1,080	305	28.6
Mesa	Passive	Direct	16,200	9,143	56.4
NHCHC	Active	Direct	3,128	866	27.7
UMich[e]	*Active*	*Direct*	*8,125*	*687*	*8.5*
UNM	*Active*	*Direct*	*3,556*	*504*	*14.2*
Primary and preventive care: None of the awardees has exceeded two-thirds of its three-year enrollment target.					
AAMC	Passive	Indirect	125,000	74,094	59.3
Altarum	Passive	Indirect	1,018,744	248,559	24.4
Avera	*Passive*	*Direct*	*5,521*	*2,788*	*50.5*
CHS	Passive and active	Indirect	8,688	4,998	57.5
Columbia	Active	Direct	1,936	1,102	56.9
U NC	*Active*	*Direct*	*2,046*	*719*	*35.1*
Wash U	*Active*	*Direct*	*4,047*	*1,598*	*39.5*
Yale	Active	Direct	3,000	1,149	38.3

Source: Cumulative enrollment data from the implementation and monitoring contractor, eighth program quarter (June–August 2016)

Notes: The target enrollment numbers reflect the targets that awardees reported in their eighth program quarter reports to the implementation and monitoring contractor. The bolded text indicates that an awardee is near, at, or above the pace needed to achieve its three-year enrollment target. The results include all participants, regardless of payer. The data are self-reported by the awardee and have not been verified by Mathematica. The calculation for the percentage of the three-year target met to date is based on dividing the total number of participants served through the eighth program quarter by the three-year participant target. For most awardees, the results are based on direct participants only, including the 11 awardees (shown in italics) that target both direct and indirect participants. For the eight awardees that target only indirect participants, we measure enrollment relative to three-year targets using indirect participants only.

Table III.2. *(continued)*

[a]The enrollment target of 4,000 submitted by the awardee to the implementation and monitoring contractor in its eighth program quarter report is lower than the target of 6,000 reported by the awardee in our site visit interviews.

[b]During the virtual site visits conducted in June 2016, WI DHS indicated that it had revised its three-year target downward to 1,470 participants from 1,573 participants, including both direct and indirect participants. The awardee defines indirect participants as those who receive intervention services but are not covered by Medicare or Medicaid.

[c]In July 2016, DMC lowered its three-year overall enrollment target to 11,525 participants from 16,130 participants, including both direct and indirect participants.

[d]The total number of participants served and the percentage of the three-year target met are overestimated. They reflect the number of participants attributed to a participating pharmacy based on any service use, not the number of participants who received intervention services. We do not have an estimate of the number of participants served for this awardee.

[e]In April 2016, UMich lowered its three-year enrollment target to 5,243 from 12,500, including both direct and indirect participants. Four months later, in August, the awardee lowered its overall enrollment target again to 2,500 participants. The awardee defines indirect participants as those who receive intervention services but are not covered by Medicare or Medicaid.

Overall, awardees using passive enrollment (that is, those whose participants benefit from the intervention simply as a result of being treated by a participating provider and are not required to enroll) are slightly more likely to be meeting enrollment goals than those requiring active enrollment. Nine (32 percent) of the 28 awardees that recruit and enroll participants actively (or both actively and passively) and 4 (36 percent) of the 11 awardees that use passive enrollment only are on track to meet their enrollment goals. With active enrollment (and recruitment), the awardee or its partners have direct contact with potential participants through telephone calls, mail, an arranged meeting, or a meeting triggered by a predefined event such as a hospital discharge or admission. If individuals agree to receive services, they are enrolled into the program. With passive enrollment (and no recruitment), participants are individuals who see a program provider and meet the program eligibility requirements. Some awardees will passively enroll participants after a triggering event (such as a qualifying encounter with a participating provider) or by default if they meet eligibility criteria. Passively enrolled participants might not be aware that they are enrolled in a program and receiving or benefiting from program services. In such cases, awardees might not have a formal mechanism for participants to refuse program services that they receive automatically. However, 6 of the 11 awardees with passive enrollment do notify participants about the program and give them the ability to opt out after they have been enrolled.

Awardees that serve participants directly (or both directly and indirectly) are more likely to be on or ahead of pace for meeting their enrollment targets than those that serve participants indirectly only.[9] Twelve of the 31 awardees (39 percent) that serve participants directly (or directly and indirectly) are on target to meet their three-year enrollment goal, compared with only one of the 8 awardees (13 percent) that only serve participants indirectly. Of the 13

[9] A direct participant is an individual who receives care or services paid for by HCIA R2 program funding, such as care coordination services. An indirect participant is anyone who does not receive such services, but who benefits from the HCIA R2 funding nonetheless. For these participants, HCIA R2 funding is generally used to provide assistance to service providers, such as funding to hire program staff, train intervention staff, and purchase or develop technology. These resources, in turn, can enhance and support clinicians' ability to deliver high-quality, cost-efficient care to participants.

awardees on track to meet or exceed their enrollment goals, all but one uses HCIA R2 funds for the direct provision of patient services. However, awardees that use HCIA R2 funds to provide direct care services to participants tend to have substantially lower enrollment targets than those that use the funds to improve care indirectly.

Awardees focusing on youths with complex medical conditions and adults with chronic physical conditions (high and low risk) have made the most progress in meeting their enrollment targets. Three of the 5 awardees focusing on children with complex needs and 8 of the 15 awardees focusing on adults with chronic conditions are on pace to meet their enrollment goals by the end of the program. Two of the 5 awardees that target people with behavioral health or cognitive disorders are on track to meet enrollment goals. However, none of the 14 awardees that target people who simply need acute or preventive care are on pace to meet their enrollment targets.

2. Factors influencing awardees' ability to reach their enrollment targets

Although a variety of factors (many of which were unique to individual awardees) are likely to have influenced enrollment efforts, three issues are reported to have affected a substantial number of awardees. Across all awardees, efforts to increase access to potential enrollees and add staff capacity to recruitment efforts facilitated enrollment. The most common barrier to enrollment across all awardees was insufficient provider and partner engagement. Two additional barriers—participants' reluctance to enroll and a lack of electronic data to identify potential participants—were more relevant for awardees targeting specific populations (such as adults with chronic conditions) rather than specific types of services for improvement (such as acute or preventive care). We discuss each of these facilitating and inhibiting factors in turn below. The factors identified as facilitators and barriers were based solely on awardees' responses.

- **Access to potential enrollees.** Awardees reported that their ability to enroll more patients was facilitated by expanding program service areas into new geographic locations, adding recruitment sites or service locations, targeting additional types of health care facilities, and conducting outreach to community providers to encourage them to make referrals. Some awardees reported that relaxing eligibility criteria to permit participants who previously would have been ineligible to enroll also helped increase enrollment. Examples include extending the length of time individuals have to decide whether or not to enroll; allowing physicians to use their clinical judgment to determine which patients to enroll, regardless of whether patients have one of the originally required clinical conditions; and expanding the list of surgical procedures that qualify a beneficiary for preoperative intervention services under HCIA R2.
- **Staff capacity.** Many awardees reported that adding staff capacity to recruitment efforts facilitated enrollment. Examples include hiring additional staff, assigning existing staff to focus exclusively on recruitment, or making adjustments in staff-to-participant ratios. These strategies helped to address challenges to enrollment when staff time became increasingly committed to service delivery or was otherwise limited. Other awardees offset their staff capacity shortages by more effectively using technology to support recruitment efforts. One awardee, for example, set up a web-based application to store information so that providers

could more efficiently retrieve enrollment data (as opposed to calling awardee staff with questions). Another awardee established a telephone hotline to more capably receive and respond to incoming referrals.

- **Provider and partner engagement.** Provider and partner engagement in making referrals was a critical component of most awardees' recruitment strategies. Although some awardees successfully leveraged relationships with internal stakeholders (such as participating providers and staff) and external stakeholders (such as community organizations) to support enrollment, many more struggled to do so. Challenges included competing demands for providers' and organizations' time, negative perceptions of enrollment processes, and lack of knowledge about or trust in a program's value. Although low provider and partner engagement was the most frequently reported barrier to enrollment across awardees, this challenge was more common among awardees serving people with behavioral health and cognitive disorders or providing primary and preventive care services. However, the reasons for this are unclear. Regardless of the population served, awardees used similar strategies to increase provider and partner engagement. For example, to educate and remind providers and community partners about the value of their programs and to encourage referrals, awardees had conversations and made presentations, shared testimonials from participating providers and patients, posted flyers about their programs, and offered incentives for making referrals. A few awardees also took steps to make their referral processes easier. One awardee, for example, switched from a paper-based to an electronic referral process.
- **Participants' willingness to enroll in the programs.** Awardees typically invested in patient outreach and education during Year 2 to try to motivate patients and remove barriers to their participation. Despite these efforts, it was difficult for some awardees to persuade patients of their programs' value and thus encourage them to enroll. This was a somewhat more common challenge for awardees that serve children with complex physical conditions and their caregivers, as well as for awardees that serve individuals with high-risk chronic conditions and individuals needing primary and preventive care. To increase the perceived benefit of the program (particularly among already-stressed target populations), many awardees conducted community outreach activities, including events and meetings in trusted venues such as community centers, churches, malls, and established community-based organizations. One awardee felt that it overcame some initial reluctance from participants by personalizing the intervention—for example, by placing photos of the program staff in informational packets that described how the intervention worked and its potential benefits.
- **Availability of electronic data to identify potential enrollees.** The availability of useful electronic data was an important influence on awardees' ability to identify potential participants. Awardees targeting children with complex physical conditions and those serving individuals with high-risk chronic conditions or offering preventive care were most affected by the lack of data to identify potential enrollees. For example, awardees that relied on Medicaid or other patient registry or EMR data to identify potential enrollees with specific diagnoses and other characteristics were stymied by difficulties in establishing agreements for data sharing or by incomplete or otherwise hard-to-use data. Many of these awardees had to rely instead on direct referrals from providers—a less accurate or efficient approach. In contrast, awardees with access to timely, high quality, and comprehensive

medical records data were able to efficiently identify potential participants. Improvements in one awardee's identification algorithm doubled the number of potential participants identified. Other awardees generated lists of potential participants from EMR data, significantly reducing providers' time and effort to identify or refer potential participants.

B. Implementation of service delivery models

1. Progress implementing service delivery models

The majority of awardees have fully implemented their service delivery models. Most awardees had hired needed program staff and started providing participants with planned services during the first program year. During the second program year, many awardees made minor refinements to their models, such as improving health IT functionality or adjusting the frequency of communication between program staff and participants. A handful of awardees made significant changes to their models in the second program year, such as replacing key implementation partners or vendors or offering new services, including medication management support, spiritual support, or neurosurgery tele-health consultations. Despite these adjustments, several awardees—including a few working to improve care for participants with lower-risk chronic conditions or aiming to improve primary or preventive care—were still struggling to implement important components of their service delivery models, such as web portals and clinical decision-support tools, at the end of the second program year.

2. Factors influencing implementation of service delivery models

There was substantial variation in the factors that either facilitated or hindered implementation progress. Despite this variation, we identified eight important drivers of implementation performance that affected multiple awardees. A range of awardees, targeting different populations and pursuing different service delivery models, identified one or more of the following factors as having important influences on program implementation:

- **Quality self-monitoring processes.** At least one awardee from every group reported that strengthening self-monitoring processes enabled it to identify opportunities to improve the implementation of the service delivery model. In particular, awardees that are focused on improving the way in which care is delivered through broader practice transformation strategies, such as implementing health IT or using data to drive quality improvement and practice workflow processes, reported that self-monitoring processes facilitated implementation. Awardees provided staff with performance reports (such as their patients' hypertension control and hemoglobin A1c values) to encourage quality improvement, worked with program staff or vendors to improve data entry, and developed new systems to track delivered services and referrals. However, several other awardees reported challenges with their self-monitoring processes, including difficulties gaining access to Medicaid data, incomplete documentation by program staff, and a reluctance of participating sites (such as hospitals) to share data with other organizations.
- **Engaging providers and community organizations.** Awardees often reported that participating sites and program staff were committed to their programs, which facilitated implementation. However, engaging external providers proved to be challenging for some awardees, particularly for awardees working to coordinate care across multiple settings.

Limited involvement in the program by community providers and organizations was most commonly reported as a barrier by awardees providing in-home services or targeting individuals with high-risk medical or behavioral health conditions or those who recently received acute or sub-acute care. To advance community engagement, some awardees have focused on improving communications with providers and conducting trainings with external organizations.

- **Staff training and resources.** Awardees flagged their ongoing staff training and technical resources as an important factor in their efforts to retain staff and deliver high quality services. This factor was especially common among awardees in the groups focused on behavioral health or cognitive disorders, acute and sub-acute care, and primary care. Several awardees indicated that in-person, individualized training was particularly important to help ensure that staff understood program intricacies. For example, program leaders at a few awardees conducted site visits to participating sites and provided one-on-one demonstrations to explain program components.
- **Positive team culture.** Many awardees reported that their team-oriented program culture and supportive supervisory structures contributed to staff satisfaction and facilitated implementation of direct services, including care management and care coordination and counseling and health education. Program leaders who created supportive structures established regular check-ins with program staff, thoughtfully considered staff ideas about how to improve programs, held workgroups or meetings to promote self-care, and offered staff peer-to-peer mentoring opportunities. In particular, awardees serving participants with complex medical conditions or behavioral health needs reported that these structures were important keys to success, in part due to the emotionally taxing nature of working with high needs populations. In contrast, one awardee reported that a lack of sufficient supervisory staff contributed to dissatisfaction and turnover among staff, which in turn impeded implementation.
- **Alignment with payers' priorities and reimbursement policies.** A handful of awardees reported that their programs' alignment with payers' priorities facilitated implementation. For example, a few awardees that focused on care management and coordination reported that because Medicaid managed care also emphasizes these activities, implementation partners may have been more likely to engage with their programs. A number of other awardees reported facing unfavorable reimbursement policies and had to develop strategies to address them. For example, awardees trained staff on submitting requests for preauthorizations. In particular, the alignment (or lack of alignment) of awardees' programs and broader payment policies influenced the implementation of programs with a practice transformation component, such as increasing provider adherence to evidence-based practice guidelines.
- **Effective participant engagement strategies.** Among programs focused on providing direct services for youths with chronic conditions, for adults with lower-risk chronic conditions, or for behavioral health or cognitive disorders, a handful of awardees reported challenges with keeping participants engaged in their programs. Program leaders reported that a myriad of factors can make it difficult for participants to keep appointments with program staff, including participants' hectic schedules, distrust of formal supports, and lack

of access to reliable transportation or child care. In particular, programs working with caregivers of children or of adults with complex conditions (as opposed to working directly with program participants) reported some difficulties maintaining engagement. Lack of patient and family engagement for this group, as noted in our discussion of enrollment issues, may stem from families being overwhelmed by the health and social issues they are facing. To improve participant engagement, awardees more actively involved caregivers in care plan development; met with participants in convenient locations such as their homes; and used technology (such as video chats, text messaging, or smartphone applications) to remain in contact with participants.

- **Access to needed community resources and social supports.** Several awardees reported challenges with connecting participants to needed services, such as non-emergent after-hours care, housing support, and in-home care. Awardees in the behavioral health and cognitive disorders group, which focused on care management and care coordination across the medical and social service systems, commonly reported this as a barrier. Typically, awardees started working with local nonprofits or government agencies to increase access to these services.
- **Useful health IT and other equipment.** Several awardees reported that technology helped facilitate program implementation by, for example, permitting analysis of program data, improving communication with participants or community providers, and reminding program staff of policies and procedures. However, several other awardees faced challenges with their health IT or other equipment, such as frequent malfunctions and inefficient data entry processes. To improve the usefulness of health IT, awardees partnered with vendors to help maintain or improve equipment, hired additional staff to help with data entry, and provided staff with additional training on systems.

C. Design and implementation of payment models

1. Progress developing and implementing payment models

As discussed in Chapter II, most awardees are focusing on payment models that move away from traditional FFS payment toward alternative payment models. These include partially capitated payments for the ongoing management and coordination of chronic and complex conditions, bundled or episode-based payment for acute or sub-acute care, and stand-alone shared savings contracts with ACOs. Some of the proposed payment models also link payment to performance or outcomes, while others incorporate upside or downside risk for providers. At the same time, nearly half of awardees are planning to leverage Medicare's new billing codes for CCM and TCM, while several are proposing to work with Medicaid or other local payers to create new FFS billing codes as part of their payment models. Many awardees are also pursuing different models with multiple payers or expecting individual provider sites to negotiate their own independent payment models with payers.

Progress in developing and implementing these models varied substantially between groups, awardees within groups, and even implementing sites within the same program. Progress varied based on type of proposed payment model and across the six groups of awardees defined by

target population. In future reports, we will assess variation in proposed payment reforms by type of intervention component.

- Two awardees (the National Health Care for the Homeless and the University of Kansas) fully implemented a payment model, while one awardee (Ventura County Health Care Agency) received CMS approval to implement a model. The National Health Care for the Homeless program is the furthest along in developing its payment model. The awardee has benefitted from building on existing models at all sites, which had some agreements in place with payers (mainly Medicaid) prior to the HCIA R2 cooperative agreement. Each site has implemented a different payment model and receives payment for respite care services by a Medicaid or Medicare ACO or through Medicaid FFS. The University of Kansas is using an existing cost-based payment structure—the Medicare fee schedule—to fund its transitional and chronic care management services. The awardee determined that patient volume would be sufficient to break even financially on these services. Ventura County Health Care's CATCHpay payment model was approved by CMS and launched in Year 2. A set amount of money will be divided among providers who successfully implement the CATCHpay program.
- A handful of awardees have signed or are expecting to sign agreements with payers during the third and final year of their cooperative agreements. Awardees targeting youths with complex medical conditions and adults who are seeking or who recently received acute or sub-acute care have made the most progress in entering agreements with payers. A small number of additional awardees in two other awardee groups are in discussions with payers and are hoping to reach agreements in the third program year.
- Nearly all awardees are still developing or refining their proposed payment models. Current activities include analyzing data to estimate the cost of providing program services, the potential cost savings from their models, or the price point for reimbursement; working with state Medicaid or commercial payers; and identifying strategies to address data limitations.
- Three awardees (Amerigroup, University of New Mexico, and George Washington University) made little progress or had not yet developed a payment proposal during the second program year. Reasons for this included the fact that recruiting participants and refining service delivery models took more resources and time than anticipated, or that no payers had agreed to cover the proposed payment amount.

2. Factors influencing development and implementation of payment models

Three common factors were important drivers of developing and implementing payment models during the second program year:

- **Ability to build or maintain strong relationships with payers.** The majority of groups included awardees that leveraged existing relationships with participating or potential payers to facilitate payment model development or implementation. These awardees used two key strategies to engage payers and foster strong relationships: (1) engaging payers in early and ongoing negotiations, both during the application phase and continuing throughout program implementation, and (2) designing payment models that were based on existing models or

payment systems with these partners, tailoring the approach to meet the payers' needs while still supporting the goals of the program to improve care at a lower cost.

- **Ability to demonstrate to payers that program services will lower costs and improve outcomes.** Several awardees reported that demonstrating the observed or anticipated benefits to patients and the cost savings to payers of the program services fostered interest from payers, even when analyses had not yet been completed. In these cases, awardees were hopeful that the interest would be translated into participation later in the cooperative agreement period. Several awardees are analyzing or planning to analyze patient-level data to demonstrate the value of their programs to payers. For example, awardees may use data to try to demonstrate the cost savings that would be derived from fewer ED visits, hospital readmissions, or averted helicopter transfers.
- **Ability to obtain data from payers.** Almost two-thirds of awardees across all awardee groups reported that they lacked the data necessary to (1) demonstrate to payers that the programs would result in lower costs for them or improved outcomes for patients or (2) establish a price point for reimbursement for new, bundled, or capitated services. Securing access to Medicare or Medicaid claims and enrollment data is a priority for most awardees. Many awardees are being proactive in addressing this challenge in several ways, such as using older or de-identified data sets for analyses, running simulations while waiting for newer data, working with state Medicaid agencies to obtain access to data, and researching alternative data sources.

D. Planning for sustainment, scalability, and replicability of HCIA R2 programs

1. Status of planning for sustaining, scaling, and replicating

As part of the application process for HCIA R2, CMS required applicants to develop payment models and plans for sustaining program components beyond the award period. We conducted an early assessment of the status of the HCIA R2 awardees' plans and progress toward sustaining their programs. Although CMS does not require the awardees to scale or replicate their programs, we also report on the limited activities in these areas. We refer to the collective plans and activities aimed at continuing the programs and expanding their reach after the current funding period as sustainability, scalability, and replicability (SSR). Specifically, we present preliminary findings from the end of the second year of the three-year award—an early check-in on SSR plans that will soon become more timely and important as awardees near the end of their cooperative agreements. (Given their centrality to HCIA R2, we discussed issues specific to the development of the payment models—a part of SSR—separately in the previous section.)

For purposes of this analysis, SSR refers to three separate aspects of continuing and expanding a program beyond the cooperative agreement:

1. **Sustainment** refers to the continuation of the HCIA R2 program components, in whole or part, across the same provider organizations and target populations.
2. **Scaling** refers to the expansion of the program to other populations, providers, sites of care, geographical areas, or payers beyond the original plans and enrollment targets. Scaling does

not include changes in eligibility criteria, providers, or catchment areas made in response to low enrollment as a strategy to meet current enrollment targets.

3. **Replication** refers to the adoption of the program, wholly or in part, by another organization (separate from the awardee) for individuals who are not participating in the HCIA R2 program.

Sustainability. We created a 4-point scale to rate awardees' progress toward sustaining their programs. Table III.3 shows the rating definitions and the number of awardees with each rating. Most awardees (31 of 39) received a sustainment planning rating of 3 or 4.

Table III.3. Summary of awardees' sustainment planning ratings

Sustainability planning rating	Rating definition	Number of awardees
4	The awardee has begun implementing strategies for sustainment.	13
3	The awardee has begun actively pursuing strategies for sustaining its program.	18
2	The awardee has minimally developed plans for sustaining its program.	7
1	The awardee has no plans to sustain its program to date.	1

Source: Discussions with awardee and program staff from July through September 2016, and review of awardees' self-reported program narratives through August 31, 2016.

One-third of awardees (13) received the highest rating of 4, meaning that they had begun actively implementing strategies for sustainment. Most awardees with a 4 rating are engaged in several sustainment-related activities. For example, most of these awardees had secured at least some post-award, ongoing payments for their program through public or private payers. Some also were engaging providers and program staff, adapting the program to be more efficient, and creating IT infrastructure to endure beyond the award period.

Awardees with a high sustainment planning rating were more likely to have (1) prior experience in implementing the program or something similar to it, (2) met their enrollment targets, and (3) used passive enrollment processes (Table III.4).

- Awardees with previous experience piloting their HCIA R2–funded program or implementing a similar program appeared to be more likely than those without such experience to be working to sustain their programs. Eleven of 27 awardees with prior experience scored a sustainment planning rating of 4 (41 percent), compared to 2 of 12 awardees without such experience (17 percent). The 8 awardees receiving a relatively low sustainment planning rating tended to struggle with low enrollment and other implementation challenges.
- Awardees that had met two-thirds of their three-year enrollment target by the second program year were considerably more likely to score a 4 on their sustainment planning rating (6 of 13 awardees, or 46 percent) compared to awardees that were farther behind on enrollment (7 of 26 awardees, or 27 percent). Although staying on pace for enrollment does not guarantee that the awardee has invested considerable time on sustainment, awardees that

have not met enrollment goals probably have not had the time or motivation to work on sustainment.

- Use of passive enrollment processes, which do not require participants' consent, may allow program staff and leaders to quickly enroll participants and focus on other issues, including sustainment. Six of the 11 awardees (55 percent) that enroll participants passively received a sustainment planning rating of 4, whereas only 6 of 25 awardees (24 percent) that actively enroll participants scored that high. Three awardees both passively and actively enroll participants; one of these scored a 4 (33 percent).

We found little relationship between an awardee's sustainability efforts to date and whether the awardee pays directly for services provided to participants (direct participants).

Table III.4. Numbers and percentages of awardees with sustainment planning rating of 4, by prior experience with program, progress toward enrollment target, type of enrollment, and type of participants

	Total number of awardees	Number of awardees with 4 rating (%)
All awardees	**39**	**13 (33)**
Experience prior to the award period		
Awardee reported prior experience piloting the program or implementing a similar program	27	11 (41)
Awardee did not report prior experience piloting or implementing a similar program	12	2 (17)
Progress toward enrollment target		
Awardees that met two-thirds of their three-year enrollment targets	13	6 (46)
Awardees that did not meet two-thirds of their three-year enrollment targets	26	7 (27)
Type of enrollment		
Passive	11	6 (55)
Active	25	6 (24)
Both passive and active	3	1 (33)
Type of participants		
Direct	31	10 (32)
Indirect	8	3 (38)

Source: Sustainability scores are based on information gleaned from discussions with awardee and program staff from July through September 2016, and review of awardees' self-reported program narratives through August 31, 2016. Information about progress toward enrollment target, type of enrollment, and type of participants comes from the forthcoming second HCIA R2 annual report. Information about awardees' prior experience comes from Table A.2 in the first HCIA R2 annual report.

We also observed some variation in the level of sustainment planning based on awardees' target populations. Awardees that enrolled youth and young adults with chronic or complex medical conditions were the most likely to have the highest sustainment planning ratings, with three of the five awardees rated 4, as seen in Table III.5.

Table III.5. Number of awardees with high sustainment planning ratings, by target population

	Total number of awardees	Number of awardees with a 4 rating (%)
All awardees	**39**	**13 (33)**
Youth and young adults with chronic or complex medical conditions	5	3 (60)
Adults with chronic physical conditions—high risk	8	2 (25)
Adults with chronic physical conditions—lower risk	7	2 (29)
Individuals (adults, young adults, or children) with behavioral health or cognitive disorders	5	1 (20)
Individuals (adults, young adults, or children) seeking or who recently received acute or sub-acute care	6	2 (33)
Individuals (adults, young adults, or children) who need primary or preventive care	8	3 (38)

Source: Sustainment scores are based on information gleaned from discussions with awardee and program staff from July through September 2016, and review of awardees' self-reported program narratives through August 31, 2016.

Scalability and replicability. Because scaling and replicating programs typically follows successful implementation and sustainment, very few programs have been scaled or replicated to date. Three awardees had scaled all or part of their programs by the end of the second program year. The remaining awardees reported no intent or were only starting to plan to scale their current programs to other providers or patients. We see no noteworthy differences in the level of scaling plans across the six awardee groups.

Replication is part of some awardees' sustainment plans because it can generate additional funding. By the end of the second program year, the programs of two awardees have been replicated by organizations independent of the awardees.

2. Factors influencing progress toward SSR

Awardees commonly described their ability to show positive program impacts as vital to sustain their programs because such evidence is usually necessary to justify receiving ongoing payment through third-party payers. From awardees' self-reported facilitators and barriers, we identified three common, broad factors that, when present, facilitated and, when absent, created barriers to demonstrating the positive program impacts. These factors included the awardees' ability or inability to engage external stakeholders or payers, align their programs with state and federal policies, and engage internal stakeholders. In addition, program complexity and the inability to monitor and demonstrate progress both posed significant barriers for many, while prior experience was a facilitator for some awardees. A given factor presented both a facilitator and a barrier for some awardees. Because the barriers and facilitators are self-reported, we may not have captured all of the awardees experiencing each factor. Furthermore, some awardees face other less common facilitators and barriers.

1. **Engaging external stakeholders or payers.** Sixteen awardees reported that their ability to generate interest and support from external stakeholders by building a business case to gain their financial support—especially from state Medicaid programs, commercial payers, and private funders—facilitated their SSR planning. Twenty-one awardees reported that their inability to gain support from payers was a significant barrier to SSR. Although some awardees are identifying other ways to fund their programs in the absence of a payment model, they are not confident that their plans will materialize.
2. **Alignment with state or federal policies and incentives.** Thirteen awardees reported that their ability to design their programs to align with the existing state or federal policy environment facilitated SSR planning.
3. **Engaging internal stakeholders.** Twelve awardees reported that their ability to engage internal stakeholders—including organizational leaders, providers, and staff integral to the program—so that they came to value the program and see its potential for growth was a key strategy to sustainment. Twenty-one awardees reported significant difficulties with engaging internal stakeholders in the same ways for several reasons.
4. **Program complexity.** While a few awardees cited that their programs had a streamlined design that facilitated SSR planning, 16 awardees reported that the complexity of their programs presented a significant barrier to SSR. These issues were especially related to large resource needs, managing and meeting partners' expectations, and complex IT systems that made usage cumbersome and that were difficult to integrate into existing EMR systems and workflows. In some cases, the awardees expect to need more resources or to drop or scale back certain program components in order to sustain the rest of the program or expand it.
5. **Self-monitoring and data collection.** As noted, the ability to demonstrate program impacts was a major challenge across awardees. A related, common barrier was access to quality, sufficient data in a timely manner, including claims data from CMS, data from commercial payers, or internal data. No awardees reported access to such data as a facilitator in SSR planning. The 16 awardees that reported significant difficulties with monitoring their program progress through data collection cited issues such as insufficient enrollment or program use, data delays, and an insufficient program duration to date.
6. **Prior experience.** Eleven awardees reported that their prior experience fosters their ability to sustain the program in the future. The awardees credited the HCIA R2 funding as an important facilitator to program sustainment because it provided the extra resources needed to fine-tune their programs. No awardee cited lack of prior experience as a major barrier.

IV. SUMMARY OF EVALUABILITY ASSESSMENT RESULTS AND BASELINE DATA ANALYSES

We have conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Section A provides an overview of the optimal impact evaluation design when random assignment was not possible—a difference-in-differences model—which we intend to use in our evaluation of the awardees' interventions. Section B describes the criteria we used to reassess evaluability in order to determine the level of rigor possible in an impact evaluation of each awardee. We then discuss the awardees for which we believe we can conduct a rigorous impact analysis in total and within the six awardee groups identified earlier in the report. For awardees for which we do not believe we can conduct a rigorous impact analysis, we summarize the reasons for this decision, and we describe the alternative data analysis that will be conducted for these awardees. We also present in Appendix A the key evaluation challenges that remain with respect to the identification of credible comparison groups, which is the most significant challenge in the use of quasi-experimental designs for program evaluation. The appendix also describes our proposed strategies for addressing these challenges.

We conclude this chapter with the presentation of baseline characteristics of awardee's participants. Section C displays baseline characteristics of 27 awardees' Medicare beneficiaries while Section D displays baseline characteristics of 5 awardees' Medicaid beneficiaries.

A. Overview of optimal impact evaluation design

When randomized trials are not feasible, we recommend using a difference-in-differences model whenever possible. This model rests on the assumption that the difference in outcomes between a pre-intervention and a post-intervention period for a well-selected comparison group will resemble the differences in outcomes between a pre-intervention and a post-intervention period that would have been observed for the treatment group had the intervention not occurred. The difference in differences for outcomes between the two groups may thus be ascribed to the intervention. To achieve this result, the optimal design matches treatment and potential comparison units on observable factors that influenced the selection of these units into treatment and that may influence study outcomes. Typically, matching is done at the same level at which the treatment was implemented; for example, when an intervention is implemented at the practice level, we would seek comparison practices. Although treatment and matched comparison units should be well-balanced after matching, we will use regression adjustment to control for observable characteristics of the study sample to ensure that the estimates are as robust as possible.

The analysis based on the difference-in-differences design will follow the beneficiaries from the time of enrollment or participation in an awardee's program—or from the time they were attributed to a provider in the awardee's program—until the end of the evaluation period (even if they withdraw from the program or no longer receive care from the provider). Thus, we are

implementing an intent-to-treat evaluation for all awardees. Similarly, we will follow matched beneficiaries in the comparison group from the time of "pseudo enrollment"—or from the time they are attributed to a comparison provider—until the end of the evaluation period.[10]

For most awardees, we will use panel data for our difference-in-differences model—that is, we will compare the change in outcomes between baseline and follow-up for program participants and matched comparisons. For a few awardees, the difference-in-differences will be based on repeat cross sections—different individuals in the baseline and follow-up periods who are served by the treatment and comparison group providers in the two periods. This approach will be needed for awardees whose intervention is designed to cover a period during or following a particular event, such as a hospital discharge or nursing home admission.

We will use claims data to construct outcome measures for each beneficiary in both the treatment and comparison groups during the intervention period for up to three years. For awardees whose intervention covers only a limited period of time, such as 30 days after a hospital discharge, we will also examine effects on outcomes over a more limited period (in addition to the longer-term effects). The baseline year will be the 365 days preceding enrollment in the intervention (or the pseudo-enrollment date for comparison beneficiaries) when we use panel data; for repeat cross sectional designs, the baseline year will be the 365 days before the program launch date.

B. Summary of program evaluability

This summary of the awardees' evaluability is derived from information from the evaluability assessments updated by Mathematica, based on program implementation and enrollment up to June 1, 2016 (21 months after the HCIA R2 awards were granted). The summary begins with an overview of the criteria we used to reassess evaluability to determine the level of rigor in the impact evaluation and concludes with the findings from our reassessment.

1. Summary of the criteria used to assess program impacts

We applied three criteria—sufficient sample size, availability of data in Medicare/Medicaid claims on outcomes expected to be affected, and potential to identify a credible comparison group—to all HCIA R2 awardees as part of our assessment of whether each of the programs can be rigorously evaluated.

Sample size requirement to detect a 10 percent or 20 percent effect. Using actual enrollment as of May 31, 2016, we estimated the cumulative number of Medicare FFS, and Medicaid FFS and managed care beneficiaries that we project to have been enrolled in each

[10] In some cases, pseudo-enrollment dates are assigned to comparison group beneficiaries to correspond to program enrollment dates for treatment group beneficiaries. When the intervention for an individual begins with a triggering event, such as a hospital discharge or entry into a nursing facility, that event will define the pseudo-enrollment date for the comparison group.

awardee's program as of February 28, 2017; this allows for a minimum of a six-month period of exposure to the intervention.[11] The projections were obtained by creating an average monthly enrollment estimate from the beginning of each program up to June 2016 and multiplying by the total number of months between the awardee's first enrollment and February 28, 2017. We then compare this projected enrollment to the minimum sample size required to yield the precision needed for a rigorous analysis. A technical appendix, available on request, provides more detail on the calculation of the sample size required to be confident of obtaining a statistically significant estimate in the sample when the true effect of the program on expenditures per enrollee per month is equal to 10 percent or 20 percent of the mean expenditures.

Claims identify the primary expected effects. We plan to use administrative (i.e., claims) data to measure core outcomes and some other key enrollee-level outcomes for both the treatment and comparison groups. The four core outcomes are (1) total Medicare and/or Medicaid expenditures, (2) number of all-cause hospitalizations, (3) number of ED visits that do not lead to a hospitalization, and (4) 30-day unplanned hospital readmissions. However, for some awardees, the primary expected outcomes may not be fully observable in administrative data or within the model testing period. We provide in the awardee narratives a description of the method we will use to evaluate these outcomes to the extent that is possible.

Ability to identify a credible comparison group by using claims data. There are two primary issues when constructing a credible comparison group for quasi-experimental designs: concern about participation or selection bias and the ability to identify the treatment and comparison groups by using claims data. In order to construct a credible comparison group, we need to select beneficiaries that match on characteristics observable in claims data, such as diagnoses or types and amounts of service use. In some instances, beneficiaries in the treatment group have entered the program based on some unobserved characteristics, such as opting into program participation or physicians referring patients whom they feel are likely to benefit from the program. If participation depends upon unobservable characteristics, we need to consider whether there is any way to closely mimic the unobserved characteristics with observable data (for example, through the use of proxy variables, such as the characteristics of a patient's ZIP code, to represent socioeconomic characteristics). If that is not possible, we will need to consider options for redefining the treatment and comparison groups on observable characteristics (for example, evaluating program effects on all those who were eligible for the program rather than only on those who actually received the intervention).

For each awardee, we will select a comparison group tailored to the particular context of the intervention, including markets, providers, and beneficiaries involved. This criterion reflects the combined assessment of our ability to draw a solid comparison group with claims data that reflects the treatment group (or some subset) on observable characteristics. For example, it would be extremely difficult to identify a comparison group for an awardee that targets homeless Medicaid beneficiaries or Medicaid children at risk of developing dental problems.

[11] The six-month window is a standard reference point, but the window for impact analyses will be lengthened or shortened depending upon each awardee's actual program.

2. Summary of evaluability assessments

Using the three criteria described above, we expect to conduct a rigorous impact analysis for 23 of the 39 awardees (Table IV.1). Across the 23 awardees, we will conduct nine evaluations that include only Medicare FFS beneficiaries and eight evaluations that include only Medicaid beneficiaries. For 6 of the 23 awardees, we will evaluate program impacts on both Medicare FFS and Medicaid beneficiaries. Detailed assessments are provided in the individual awardee program narratives in Appendix B of this report. It is important to note that our current assessment of evaluability is based on some critical assumptions that may change for a number of reasons that we would like to highlight: (1) the level of enrollment for any awardee differs from our projections based on the awardee's prior enrollment rate; (2) variance in outcome measures increases substantially during the treatment period, requiring a larger sample that, at this point, cannot be supported by enrollment; (3) Medicaid data for services received through at least February 2017 will not be available by February 2019, which is when we will begin the analysis for our final evaluation report; and (4) we are not able to draw a solid comparison group because we cannot replicate the awardee's stated recruitment criteria or because claims data do not support an intent-to-treat comparison group.

Table IV.1. Awardees for which we are likely to be able to conduct a rigorous impact evaluation

Awardee group	Number of awardees	Rigorous impact analysis likely for Medicare enrollees	Rigorous impact analysis likely for Medicaid enrollees
Youth with complex conditions	4		NACHRI, SCH, UIC, WI DHS
High-risk chronic conditions	4	NM, **NYC H+H**, UHCMC, U KS	**NYC H+H**
Lower-risk chronic conditions	6	ACCF, **CCNC**, CHIIC, **FPHNY**, **Ventura**, **VillageCare**,	**CCNC, FPHNY**, **Ventura**, **VillageCare**
Behavioral health and cognitive disorders	3	UCSF	Clifford Beers, Montefiore
Acute and sub-acute conditions	1	**Mesa**	**Mesa**
Primary and preventive care	5	AAMC, Avera, CCC	Altarum, Columbia

Notes: High risk is defined as having a precipitating inpatient or emergency department (ED) service that triggers enrollment into the program or having clinical conditions associated with a high risk of having inpatient or ED service use in the coming year. Bolded awardees indicate those we expect to conduct a rigorous impact analysis on, for both Medicare and Medicaid enrollees.

For awardees for which we cannot conduct a rigorous impact analysis, we present in Table IV.2 a summary of the criteria we used in making this determination by awardee groups. Although there could be multiple reasons that we are unlikely to conduct a rigorous impact evaluation, we highlight the reason that presents the most significant challenge and the one that is most unlikely to change.

Overall, we find that of the 16 awardees that cannot be evaluated rigorously, half (8) have insufficient numbers of enrollees. Among the other 8 awardees, 5 have no identifiable, credible

comparison group; 1 (George Washington University) ended its participation too early to support an evaluation; and 2 awardees will lack the necessary data (1 awardee because Medicaid data will not be available in time and 1 awardee because the program expects to affect outcomes measured in claims data only over a very long period, well past the end of the demonstration).

Youth and young adults with chronic or complex physical conditions. Among this group of five awardees, we expect to be able to conduct a rigorous impact evaluation of four awardees' programs. The exception is Boston Medical Center, for which we do not expect to have sufficient statistical power because of low enrollment.

Adults with chronic conditions—high risk. Among this group of eight awardees, we expect to be able to conduct a rigorous impact evaluation of four programs. For Northwell, we do not expect to have sufficient statistical power because of low enrollment. For Four Seasons, the University of California at San Diego, and Detroit Medical Center, we are unlikely to be able to draw a solid comparison group.

Adults with chronic physical conditions—lower risk. Among this group of seven awardees, we expect to be able to conduct a rigorous impact evaluation of six of the awardees' programs. George Washington University terminated its program early because of implementation challenges. Therefore, we will not be conducting an evaluation, given the limited exposure time of participants.

Individuals with behavioral health and cognitive disorders. Among this group of five awardees, we expect to be able to conduct a rigorous impact evaluation of three of the awardees' programs. For Johns Hopkins University, we do not expect to have sufficient statistical power to assess the primary effect of its program, which is to delay the time to nursing home placement and reduce the associated costs. For Amerigroup, we do not expect to have sufficient statistical power because of low enrollment, but we have an even greater concern that the primary outcomes of the awardee's program (such as health knowledge, life skills, and employment) are not observable in Medicaid claims data, and there is no other source of data available for any potential comparison group.

Adults who are seeking or who recently received acute or sub-acute care. Across the six groups of awardees, a rigorous impact evaluation is most challenging for awardees focusing on acute and sub-acute conditions. Of the six awardees in this group, we are likely to conduct a rigorous impact evaluation for only one awardee, Mesa Fire and Medical Department. For the University of New Mexico, Mount Sinai (both the acute and SAR components of its program), the University of Michigan, and the University of North Carolina, projected enrollment will not support detecting a 20 percent effect in total Medicare or Medicaid expenditures. For National Health Care for the Homeless, we are concerned about using ICD supplemental diagnosis codes that reflect homelessness to identify a solid comparison group that comprises homeless individuals with Medicare or Medicaid insurance.

Table IV.2. Evaluation criteria for awardees for whom a rigorous impact evaluation will not be conducted

	Project Medicare enrollment with 6 months of program exposure	Project Medicaid enrollment with 6 months of program exposure	Sample size requirement for MDE of 20% for expenditures	Do claims identify the primary expected effects?	Likelihood of solid comparison group	Primary reason for no rigorous evaluation
Youth with complex conditions						
BMC	0	321	873	Some effects observed in claims data but important effects likely missing	Too early to determine due to delay in Medicaid data	Too few treatment beneficiaries
High-risk chronic conditions						
DMC	248	3382	641	Yes	Serious concern	Lack of strong comparison group
FSCL	2929	0	176	Yes	Serious concern	Lack of strong comparison group
Northwell	81	45	487	Yes	Some issues but probably surmountable	Too few treatment beneficiaries
UCSD	999	214	704	Some effects observed in claims data but important effects likely missing	Serious concern	Lack of strong comparison group
Lower-risk chronic conditions						
GWU	N/A	N/A	428	Yes	Serious concern	Program terminated
Behavioral health and cognitive disorders						
Amerigroup	0	545	733	Some effects observed in claims data but important effects likely missing	Too early to determine due to delay in Medicaid data	Outcome not included in claims data
Hopkins	335	2	601	Some effects observed in claims data but important effects likely missing	Some issues but probably surmountable	Too few treatment beneficiaries
Acute and sub-acute conditions						
NHCHC	944	2180	418	Yes	Serious concern	Lack of strong comparison group

Table IV.2. *(continued)*

	Project Medicare enrollment with 6 months of program exposure	Project Medicaid enrollment with 6 months of program exposure	Sample size requirement for MDE of 20% for expenditures	Do claims identify the primary expected effects?	Likelihood of solid comparison group	Primary reason for no rigorous evaluation
UNM	318	0	953	Yes	Some issues but probably surmountable	Too few treatment beneficiaries
Icahn–acute	105	218	305	Yes	Serious concern	Too few treatment beneficiaries
Icahn–SAR	140	0	242	Yes	Serious concern	Too few treatment beneficiaries
UMich	326	210	291	Yes	Serious concern	Too few treatment beneficiaries[a]
U NC	301	0	1842	Yes	Some issues but probably surmountable	Too few treatment beneficiaries
Primary and preventive care						
CHS	0	0	1842	Yes	Too early to determine due to delay in Medicaid data	Lack of timely Medicaid data by final report
Wash U	0	1097	1146	Some effects observed in claims data but important effects likely missing	Too early to determine due to delay in Medicaid data	Lack of strong comparison group
Yale	309	78	359	Yes	Some issues but probably surmountable	Too few treatment beneficiaries

[a]Although the number of Medicare enrollees (326) exceeds the required sample size, many of the 326 projected enrollees are likely to have received the awardees' very similar intervention in the pre-HCIA period, making them unusable in our difference-in-differences analysis.

MDE = minimum detectable effect.

Individuals needing primary or preventive care. Among this group of eight awardees, we expect to be able to conduct a rigorous impact evaluation of five of the awardees' programs. For Yale University, we are restricted to analyzing one of the three program arms—that is, treatment group beneficiaries who had an ED visit for a fall. We do not believe that projected enrollment in this treatment arm will support detecting a 20 percent effect in total Medicare or Medicaid expenditures. For the Children's Home Society, it is likely that we will not be able to conduct a rigorous impact evaluation because the awardee does not provide us with patient identifiers that would allow us to use Medicaid data. For Washington University, there are significant challenges that will limit our ability to construct a strong comparison group.

Overall, we are reasonably confident that we can establish a solid comparison group to support a difference-in-differences analysis for the majority of the awardees' programs. We will continue to refine our strategies for estimating program impacts by addressing the distinct challenges presented by each awardee with respect to identifying a credible comparison group. As data become available, it will be necessary to ascertain how well we can match beneficiaries and providers on observable characteristics. The results of these efforts will be reported in forthcoming quarterly and annual reports.

C. Characteristics of Medicare FFS beneficiaries at baseline

Our analysis of baseline claims and enrollment data for the Medicare FFS beneficiaries in 27 of the HCIA R2 programs shows that the way in which the awardees targeted their programs has led them to enroll beneficiaries whose characteristics differ markedly from those of the Medicare FFS population nationwide. The data cover the year before enrollment for all beneficiaries who enrolled in an awardee's program on or before May 31, 2016 (the first 21 months of the 3-year funding period). All 27 awardees submitted a finder file containing at least 50 Medicare FFS beneficiaries enrolled in their programs who also met the evaluation inclusion criteria.[12] In addition to these 27, two awardees submitted finder files containing only Medicaid enrollees. The remaining 10 awardees were excluded from analysis for the following reasons:

- For 6 awardees, the finder files were composed solely or predominantly of Medicaid enrollees and have not yet been analyzed.
- For 3 awardees, we did not receive a finder file in time to be processed for this report, or we received a file with problems that could not be resolved in time.
- One awardee, George Washington University, has withdrawn from the HCIA R2 initiative. Its files will not be processed further.

[12] Beneficiaries included in the analysis were enrolled in an awardee's program on or before May 31, 2016, according to the awardees' finder files, in order to have at least three months of claims run-out for the baseline year by the time analysis files were pulled for this analysis in late August 2016. We then applied additional inclusion criteria: beneficiaries had to be enrolled in Medicare FFS, they had to have Part A and Part B coverage, and they had to have Medicare as the primary payer on their enrollment date and for at least 90 days during the 365 days before their enrollment date.

Table IV.3 shows the awardees that are included in and excluded from our analysis of baseline characteristics, the reasons for excluding them, and the number of participants who met the inclusion criteria. In addition, the table identifies the 15 awardees that have program-specific measures and the 2 for which we present either a comparison or a control group in this report.

Table IV.3. Awardees included in and excluded from the baseline analysis

Awardee	Received usable finder file in time for inclusion?	Cumulative number of eligible Medicare FFS enrollees as of May 31, 2016	Awardee included in this report	Awardee-specific measures included in this report	Comparison group included in this report
All awardees			29[b]	15	2
Youth with complex medical conditions					
BMC	Yes, but mainly Medicaid enrollment	NA	N	NA	N
NACHRI	Yes, but mainly Medicaid enrollment	NA	N	NA	N
SCH	No, and mainly Medicaid enrollment	NA	N	NA	N
UIC	Yes, but mainly Medicaid enrollment	NA	Y[b]	Y[b]	Y[a]
WI DHS	Yes, but mainly Medicaid enrollment	NA	Y[b]	NA	N
High-risk chronic conditions					
DMC	Yes	162	Y	Y	N
FSCL	Yes	2,050	Y	Y	N
NM	Yes	299	Y	N	N
Northwell	Yes	97	Y	N	N
NYC H+H	Yes	2,136	Y	Y	N
UCSD	Yes	653	Y	Y	N
UHCMC	Yes	327	Y	Y	N
U KS	Yes	1,244	Y	N	N
Lower-risk chronic conditions					
ACCF	Yes	918	Y	Y	N
CCNC	Yes	40,480	Y	N	N
CHIIC	No[c]	18,052	Y	N	N
FPHNY	Yes	220	Y[b]	Y	N
GWU	No	NA	N	NA	NA
Ventura	Yes	416	Y	Y	N
VillageCare	Yes	312	Y[b]	Y	N
Behavioral health or cognitive disorders					
Amerigroup	Yes, but mainly Medicaid enrollment	NA	N	NA	NA
Clifford Beers	Yes, but mainly Medicaid enrollment	NA	N	NA	NA
Hopkins	Yes	158	Y	N	N
Montefiore	Yes	122	Y[b]	N	N
UCSF	Yes	235	Y	Y	Y[a]
Acute and sub-acute care					
Icahn (acute & sub-acute)	Yes	166	Y	N	N

Table IV.3. *(continued)*

Awardee	Received usable finder file in time for inclusion?	Cumulative number of eligible Medicare FFS enrollees as of May 31, 2016	Awardee included in this report	Awardee-specific measures included in this report	Comparison group included in this report
Mesa	Yes	629	Y	Y	N
NHCHC	Yes	61	Y	Y	N
UMich	Yes	222	Y	N	N
UNC	Yes	228	Y	Y	N
UNM	Yes	184	Y	Y	N
Primary or preventive care					
AAMC	Yes	91,064	Y	NA	NA
Altarum	No	NA	N	NA	NA
Avera	Yes	4,624	Y	N	N
CCC	Yes	932	Y	N	N
CHS	No	NA	N	N	N
Columbia	No	NA	N	NA	NA
Wash U	Yes, but mainly Medicaid enrollment	NA	N	NA	NA
Yale	Yes	193	Y	NA	NA

[a]For UIC and UCSF, we are using participants randomly assigned to treatment and control groups to measure program impacts.

[b]We present baseline demographic, expenditure, and service use characteristics for Medicare enrollees for 27 awardees, and for 3 of these 27 awardees (FPHNY, Montefiore, and VillageCare), we also present demographic, expenditure, and service use characteristics for Medicaid enrollees. For the other two awardees (UIC and WI DHS), we do not present expenditure and service use characteristics because they do not have any Medicare enrollees and their Medicaid claims data were not available for the baseline period. For UIC and WI DHS, we present only demographic characteristics and only for Medicaid enrollees.

[c]CHIIC provides encounter-level data, with one record for each encounter with a health coach. The encounter data includes enrollee name, date of birth, and gender, as well as date and type of health coaching service. However, the awardee does not collect or provide beneficiary IDs or payer information. As a result, we will attempt to identify enrollees in Medicare enrollment data by using their name, date of birth, gender, and state of residence. For those enrollees for whom we can find a match, we will use their Medicare IDs to pull their claims and conduct an impact analysis.

FFS = fee-for-service; N = no; NA = not applicable; Y = yes.

The number of Medicare FFS beneficiaries enrolled in an awardee's program through May 2016 (as reported on the finder files) who meet our inclusion criteria varies substantially across the 27 awardees we examined. Only 7 have over 1,000 such beneficiaries (and one has over 1,000 Medicaid beneficiaries). Thirteen have fewer than 300 beneficiaries who meet the inclusion criteria, an amount we and many other evaluators view as the absolute minimum number required to warrant conducting a formal impact analysis of most claims-based outcomes (assuming a minimum detectable effect (MDE) of 20 percent of the mean for an outcome with a coefficient of variation of 1.0, such as a binary variable with a mean of .50).

Among the 27 awardees for which we could conduct an initial baseline analysis by using Medicare FFS data, four noteworthy patterns emerged with respect to the participants' sociodemographic characteristics, health status, and Medicare expenditures (Table IV.4).

1. **The proportion of program participants with disability as their reason for Medicare entitlement often markedly exceeds that in the general Medicare FFS population.** For 8 of the 27 awardees, over half the participants were originally eligible for Medicare because they had a disability, which is more than twice the share of the Medicare FFS population nationwide (24 percent).[13] For some awardees, the high percentage of Medicare participants with a disability is to be expected because they target a younger adult population. For instance, more than 89 percent of participants in VillageCare's Rango program, which targets young adults with HIV and AIDS, were originally eligible for Medicare because of a disability. Under the Social Security rules, people who cannot work as a result of HIV/AIDS (or other health conditions) are considered to be disabled. However, even awardees that are not specifically targeting a young population can have a high percentage of Medicare participants with a disability. For example, Nebraska Medicine serves people with Type 2 diabetes, and 51 percent of its participants were originally eligible for Medicare because of a disability, more than double the national average.

2. **For 18 of the 27 awardees, the percentage of participants who are dually eligible for Medicare and Medicaid is above (often well above) the national average.**[14] For eight awardees, more than half of the Medicare FFS participants are dually eligible for Medicaid. In many cases, the reasons for the variation in the dual-eligible populations are easy to understand. For example, the Johns Hopkins University, whose program consists of 82 percent dual eligibles, explicitly targeted dual eligibles from the start. The awardee recently relaxed this criterion because of recruitment challenges. Eighty percent of enrollees in Ventura County Health Care's program, which focuses particularly on vulnerable members of the community, are dually eligible. By contrast, the proportion of dual-eligible beneficiaries is low for several awardees. The University of California at San Francisco has only 9 percent dual eligibles in its program, substantially below the 18 percent in the entire Medicare population. CareChoice's program, targeted primarily to Medicare patients in SNFs, has only 12 percent dual eligibles.

3. **For nearly every awardee, program participants have a greater need for care and higher Medicare spending than does the general Medicare FFS population.** Only one of the 27 awardees included in this analysis has beneficiaries with a mean HCC score of less than one (that is, below the national average). For all but two awardees, mean monthly expenditures in the year before beneficiaries enrolled exceeded the national average. Mean values for HCC score and monthly Medicare expenditures across awardees were 2.03 in the year before enrollment (that is, more than twice the national average) and $2,083 (about 2.5

[13] National averages are based on the 5 percent Medicare FFS sample.

[14] Comparisons to the national average should be regarded as a broad indicator of differences between awardees. The proportion of Medicare beneficiaries who are also enrolled in Medicaid varies markedly across states, ranging from 12 to 34 percent.

times the national average), respectively. For 12 of the 27 awardees, the mean HCC scores exceeded 2.0. For 15 awardees, Medicare spending at baseline was more than twice the national average.

4. **Across awardees, the highest HCC scores and mean baseline spending amounts are associated with interventions that target either specific conditions or beneficiaries who have recently received institutional care.** Of the five awardees whose mean HCC score is more than 2.5 times the national average and whose mean Medicare expenditure is at or near more than 4 times the national average, three address severe conditions: terminal illness (Four Seasons), cancer (Cleveland Medical Center), and recovery from acute illness while homeless (National Health Care for the Homeless). The remaining two awardees in this very high-cost group target patients who are eligible for or receiving Medicare-covered institutional care (Mount Sinai and CareChoice). By contrast, both the Catholic Health Initiatives and the Association of American Medical Colleges target patients in primary care settings. For these awardees, the mean HCC scores and mean Medicare spending are only slightly above the national average.

Table IV.4. Selected characteristics of Medicare FFS beneficiaries when they enrolled in the awardees' programs

Awardee	Cumulative number of eligible Medicare FFS enrollees as of May 31, 2016[a]	Percentage of participants younger than 65	Percentage of participants who originally qualified for Medicare on the basis of disability	Percentage of participants dually eligible for Medicare and Medicaid	Mean HCC score[b]	Average Medicare expenditures PBPM
National average[c]	—	17%	24%	18%	1.00	$792
All awardees[d]	166,184	25%	35%	35%	2.03	$2,083
High-risk chronic conditions						
DMC	162	61%	71%	51%	1.50	$1,503
FSCL	2,050	<1%	15%	25%	3.46	$3,026
NM	299	35%	51%	34%	2.10	$1,897
Northwell	97	16%	29%	15%	2.66	$2,353
NYC H+H	2,136	33%	42%	54%	1.44	$2,072
UCSD	653	9%	15%	18%	1.09	$815
UHCMC	327	14%	20%	14%	3.74	$3,719
U KS	1,244	11%	21%	16%	1.74	$1,382
Lower-risk chronic conditions						
ACCF	918	10%	20%	12%	1.48	$986
CCNC	40,480	41%	55%	72%	1.47	$978
CHIIC	18,052	10%	17%	17%	1.05	$509
FPHNY	220	45%	56%	56%	2.07	$2,364
Ventura	416	51%	66%	80%	1.58	$1,262

Table IV.4. *(continued)*

Awardee	Cumulative number of eligible Medicare FFS enrollees as of May 31, 2016[a]	Percentage of participants younger than 65	Percentage of participants who originally qualified for Medicare on the basis of disability	Percentage of participants dually eligible for Medicare and Medicaid	Mean HCC score[b]	Average Medicare expenditures PBPM
VillageCare	312	85%	89%	63%	1.60	$1,329
Behavioral health or cognitive disorders						
Hopkins	158	8%	28%	82%	2.05	$1,839
Montefiore	122	43%	51%	38%	1.47	$1,754
UCSF	235	3%	8%	9%	1.33	$1,078
Acute and sub-acute care						
Icahn (MACT)	71	8%	17%	28%	2.90	$3,500
Icahn (SAR)	95	3%	14%	22%	3.20	$4,700
Mesa	629	29%	38%	30%	2.24	$2,549
NHCHC	61	77%	79%	79%	2.70	$4,357
U NC	228	18%	28%	20%	0.95	$576
UMich	222	22%	32%	18%	2.32	$2,188
UNM	184	18%	28%	30%	1.86	$1,530
Primary or preventive care						
AAMC	91,064	19%	25%	17%	1.28	$1,109
Avera	4,624	8%	19%	23%	2.49	$2,440
CCC	932	10%	17%	12%	2.66	$3,509
Yale (ED visit)	193	10%	22%	34%	2.32	$3,004

Source: Medicare claims and enrollment data, September 1, 2013–May 31, 2016

[a]Beneficiaries included in this report were enrolled in an awardee's program on or before May 31, 2016. They also had to be enrolled in Medicare FFS, have both Part A and B coverage, and have Medicare as the primary payer on their enrollment date and for at least 90 days during the 365 days before their enrollment date.

[b]HCC scores were calculated by Mathematica for the same 365-day period.

[c]National averages are based on the 5% Medicare FFS sample for 2014.

[d]Mean values for all awardees are weighted by awardee and not by beneficiary.

ED = emergency department, FFS = fee-for-service, HCC = hierarchical condition categories; PBPM = per beneficiary per month.

Thirteen of the 27 awardee narratives (in Appendix B of this report) with Medicare FFS enrollees include measures that are specific to each of those awardees. Although some of these measures capture outcomes relevant to a particular program, others are necessary to determine how well the definition of an awardee's target population aligns with information in claims data. Such information is critical for selecting an appropriate comparison group. For example, New York City Health + Hospitals targets frequent ED users who have ambulatory care sensitive conditions (ACSCs); the awardee uses the Agency for Healthcare Research and Quality's

(AHRQ) Prevention Quality Indicators (PQIs) to identify beneficiaries in its target population based on their diagnoses and utilization over the previous year.

D. Characteristics of Medicaid beneficiaries at baseline

We have received and have begun to process Medicaid data for five awardees. Because of the diversity of programs and of services covered for these populations, a summary table providing consistent information across programs is more difficult to construct for Medicaid enrollees than for Medicare beneficiaries. Table IV.5 compares participants in the five programs across four dimensions, when the appropriate data are available. With the noteworthy exception of the University of Illinois, each of the awardees enrolled a few hundred participants, nearly all of whom are eligible for full Medicaid benefits. For the three awardees for which information was available, the proportion of participants who were also enrolled in Medicare is strikingly similar across programs, at about 24 percent. More detailed information for each awardee appears in Appendix B. The much lower mean Medicaid expenditures for Montefiore Medical Center than for the Fund for Public Health in New York and VillageCare is due to differences in their target populations. Montefiore targets people with behavioral health problems, including children with attention deficit hyperactivity disorder. VillageCare targets patients with HIV and the Fund for Public Health in New York targets individuals with hepatitis C; both of these patient groups have very high prescription drug costs.

Table IV.5. Characteristics of program participants enrolled in Medicaid for five awardees

Awardee	Cumulative number of eligible Medicaid FFS enrollees as of May 31, 2016	Percent with full Medicaid benefits	Percent dually eligible for Medicare and Medicaid	Mean Medicaid spending in baseline year
FPHNY	552	97%	25%	$4,096
Montefiore	487	96%	21%	$1,194
UIC	14,278	NA	NA	NA
VillageCare	530	98%	24%	$5,445
WI DHS	203	NA	NA	NA

Note: We present baseline demographic, expenditure, and service use characteristics for FPHNY, Montefiore, and VillageCare. For UIC and WI DHS, we do not present expenditure and service use characteristics because their Medicaid claims data were not available for the baseline period. For UIC and WI DHS, we only present demographic characteristics.

FFS = fee-for-service, NA = not available.

V. NEXT STEPS

A. Implementation evaluation

During the third year of the project, the implementation evaluation will focus on three issues:

1. **Updating our understanding of awardees' service delivery models after they became fully operational.** Specifically, we will collect updated information on the targeting, content, and process of each intervention. Questions related to targeting include what types of patients were targeted, what types of patients were excluded, how much effort was spent on identifying patients who were likely to benefit from the intervention, and what steps were taken to identify and recruit them. Questions related to content include what the main features of each component were, how intensively and consistently these features were implemented, how long they were implemented for, and who implemented them. Questions related to process include how the program was rolled out and explained to providers, patients, and caregivers; what program leaders did to engage them; and what steps were taken to monitor patient compliance with care plans or prescribed regimens. See Mahoney (2010) for a general description of this analytic approach.[15]
2. **Continuing to collect evidence on how effectively each major component was implemented.** To measure implementation effectiveness, we will attempt to determine whether (1) the program served the number and type of patients it expected to; (2) program milestones were implemented on schedule; (3) the awardee recruited and trained the number and type of frontline staff that it expected to; and (4) frontline staff provided the type and number of services they intended to. We will also continue to collect information on the factors that facilitated and impeded the awardees' ability to meet their implementation goals.
3. **Collecting updated information on the design and implementation of awardees' payment models.** We will continue to track awardees' efforts to add details to and operationalize their payment models as they approach the end of their cooperative agreements. We will integrate our findings with a broader discussion of the strategies used to sustain each program.

Building on earlier implementation findings, the information we collect during the final year of the program will enable us to describe each awardee's intervention in detail after it became fully mature, whether it was implemented as intended, and the barriers to and facilitators of successful program implementation. Toward the end of Year 3, we will begin to integrate our implementation findings with the interim results of the impact analyses. Evidence of successful implementation will ultimately help us corroborate any positive impacts we find. Conversely, evidence of implementation failure may lead us to conclude that a given program did not provide

[15] Mahoney, Jane E. "Why Multifactorial Fall-Prevention Interventions May Not Work." Invited commentary in *Archives of Internal Medicine*, vol. 170, no. 3, July 12, 2010, pp. 1117–1119.

a reasonable test of the proposed service delivery model and thus offer one possible explanation for any null impact findings we observe.

The implementation evaluation will be based on two sources of evidence. First, we will continue to review documents from the awardee and from CMMI's HCIA R2 implementation and monitoring contractor. These documents include the quarterly progress reports from the awardee and the implementation and monitoring contractor, the self-monitoring metrics that the awardee reports about the intervention it delivered, any updates to the awardee's operational plans, and the annual payment report.

Second, we will conduct a third and final round of interviews with awardee leaders; frontline staff; and other key stakeholders, such as advisory committee members or organizational partners. We will conduct the interviews—either in person or through virtual site visits via teleconferences or webinars—in the spring and summer of 2017, to coincide with the end of the third and final year of the cooperative agreements. Prior to the interviews, we may prepare and ask awardees to review a profile reflecting our understanding of their service delivery and payment models. If necessary, we will conduct follow-up interviews with key program staff to ensure that we have a comprehensive understanding of the features of their service delivery and payment models. We will also collect awardees' opinions about what they believe was responsible for their program's success in reducing Medicare or Medicaid expenditures, should the final impact evaluation indicate such success. On the other hand, if the program did not achieve lower costs, we will ask the awardee what they believe are the factors contributing to this result. In addition, we will ask what they feel would be responsible for their program's failure to have such effects, should that be the result of our eventual analysis. We will include the results of our analyses in the third annual report due in January 2018.

B. Sustainability, scalability, and replicability

We will continue to track SSR planning status and the factors affecting it to enhance the preliminary analysis presented in this report. We plan to update SSR findings in early 2018, after the awardees' contracts end, based on the third and final round of interviews with the awardees this summer, a review of the awardee-submitted reports, and available early impact estimates. We will report on awardees' plans for addressing the dilemma they face of having their contract end before having the evidence from the CMS-funded evaluation of the program's impacts. After the impact analysis is complete, we will conduct a more thorough and informed assessment of the factors that must be considered for scaling up and potentially replicating successful programs. Further, our qualitative SSR findings will help inform the quantitative payment model analysis and the actuarial simulations of the individual payment models as well as the potential financial impacts from broad expansion of successful programs.

C. Impact analysis

During the third year of the evaluation, the impact analysis will kick into high gear. Enough individuals have enrolled in many of the awardees' programs to warrant both the selection of comparison group members and the estimation of impact estimates for early enrollees. We have begun to select comparison groups for some awardees in order to establish our procedures and

programs for this task. We will postpone the remainder of the matching for Medicare enrollees until June 2017, when the finder files covering enrollment through February 2017 will become available and claims data can be pulled for the entire pre-enrollment period for all of these enrollees. This group of enrollees will comprise the full Medicare analysis sample for the final report, because only those enrolled before the end of February 2017 will have six months of exposure to the interventions by the time the HCIA R2 program ends in August 2017. Thus, only one round of matching will be necessary for Medicare enrollees.

Receipt of the finder files will set in motion a series of analysis activities. We will pull the necessary Medicare claims data in mid-June 2017, covering all services received through February 2017 (allowing for a three-month lag to get highly complete data). We will use these claims data to construct baseline variables for all enrollees and for potential comparison cases, and then use these variables to select the comparison groups. Following the selection of the comparison groups, we will construct the core and awardee-specific outcome variables for the program period and estimate program impacts for this interim sample. The interim sample of Medicare enrollees will include only those who enrolled in the awardee programs through August 2016 (the first two years of HCIA R2 funding), so that everyone will have at least six months of exposure to the intervention and complete data on outcomes through February 2017.

We will present the interim results for Medicare enrollees in the third annual report for at least some of the awardees. The remainder will be produced over the subsequent two months and may be included in a revised version of the third annual report, if CMMI wishes and timing permits, or will be presented in one or more separate memos, and summarized in the May 2018 quarterly report.

The analogous work to produce impact estimates for Medicaid enrollees will follow the Medicare analysis with a three-month lag. Staggering the analysis of Medicaid enrollees will allow for a smoother workflow. Furthermore, delaying the Medicaid interim analysis a few months will allow for larger samples and a longer follow-up period, given the much longer data lag in Medicaid claims between when services are rendered and when the data capturing those services are fairly complete and available to us (at least 12 months rather than the standard 3 months for Medicare data).

Table V.1 presents the current schedule and timeline for the impact analysis work this year. The second column shows the timeline assuming that we conduct the Medicare and Medicaid analyses concurrently. The third column gives the timeline for the Medicaid analyses if those analyses are conducted three months later than the Medicare analyses.

Table V.1. Timeline for impact analysis activities during the third year of the evaluation

Activity	Medicare analyses	Medicaid analyses
Use finder file to identify all enrollees through February 2017	May 2017	August 2017
Pull data for services	May 2017 (for services rendered through February 2017)	August 2017 (for services rendered through August 2016)
Build data files for baseline and follow-up periods	June 2017–July 2017	September 2017–October 2017
Conduct propensity score matching	August 2017–September 2017	November 2017–December 2017
Generate preliminary impact estimates	October 2017–November 2017	January 2018–February 2018
Write up findings from preliminary analyses	December 2017–January 2018	March 2018–April 2018

Note: Interim analyses will include all Medicare beneficiaries enrolled through August 2016, and all Medicaid enrollees who joined through February 2016. Results from preliminary impact analyses on Medicare enrollees completed in time for the third annual report will be included in that report. Preliminary impact estimates for Medicare beneficiaries for other awardees, and for all preliminary analyses conducted on Medicaid enrollees, will be reported in separate memos as they become available.

D. Surveys

We completed our data collection effort for the non-clinician staff survey in the fall of 2016. During the coming months, we will analyze the staff survey data and include a summary of the results in the third annual report in January 2018. During the next (third) evaluation year, our survey activities will focus primarily on preparing and fielding the clinician survey and the patient survey.

We pre-tested the clinician survey and will begin full data collection in March 2017. The survey will focus on the experiences of clinicians who are implementing the interventions or providing care or services to participating beneficiaries. Clinicians to be surveyed include the physicians, dentists, nurse practitioners, and physician assistants participating in 18 of the 39 awardees' programs. We selected these 18 awardees because of the central role that clinicians play in their HCIA R2-funded interventions. We expect to have approximately 2,300 completed surveys from clinicians across the 18 selected awardees. However, we are still collecting our survey sample, and we may update the expected number of completes after we have received full sample lists from participating awardees. We will conduct the clinician survey online and will provide paper questionnaires to respondents upon request.

The goal of the clinician survey is to understand the experiences of clinicians and their perceptions of the effect of the program on their patients. The questionnaire will cover six areas:

1. Clinician roles and responsibilities
2. Clinician training
3. Daily work and work environment

4. Program start-up and provision of care and services
5. Program effectiveness
6. Clinician demographics and background

During the third year of the evaluation, we will also pre-test and administer the patient survey. The goal of this survey is to assess patients' experiences with the programs and their perceptions of the effect of the interventions on the care they receive. We will pre-test the patient survey in early 2017 and field it in May 2017. We are now identifying the awardees to include in the data collection effort, and we are determining how to obtain contact information for eligible participants so we can mail the questionnaire to them. The survey will be limited to awardees' Medicare, Medicaid, and dually eligible enrollees.

The patient questionnaire will be a mail-out, paper survey, and it will be available in English and Spanish. The questionnaire will cover four topics:

1. Program use and participation
2. Experience and satisfaction with the program
3. Perception of program effects
4. Participant demographics

We expect about 300 completes per participating awardee in general; however, we expect that some awardees included in the survey will have fewer than 300 enrollees. A few awardees will have more than 1,000 enrollees, and for those, we will select a sub-sample to include in the survey, so as to reduce burden among potential respondents but still have 300 completed surveys. We will update these estimates after we have collected our sample in March and April 2017.

Table V.2 shows the awardees to be included in each of the three surveys. Thirty-six of the original 39 awardees received the staff survey. Of the 38 awardees remaining (after George Washington University withdrew), 18 will receive the clinician survey and 21 will receive the patient survey. However, the awardees to be included in the clinician and patient surveys could change if we cannot develop a reliable list of clinicians and beneficiaries who would be the respondents. The National Association of Children's Hospitals and Related Institutions is the only awardee not to receive any survey. This awardee's intervention involves multiple hospitals across the country. Unfortunately, the awardee did not arrange for all of the participating hospitals to adhere to a single Institutional Review Board (IRB). As a result, inclusion of its hospitals in our surveys would have required individual submissions to each hospital's IRB, a burden that the awardee believed was unwarranted and did not want to put on its partnering hospitals. We plan on reporting the results from the clinician and patient surveys in the third annual report, due January 2018.

Table V.2. Awardees to be included in staff, clinician, and patient surveys

Acronym/ abbreviation	Awardee	Staff survey	Clinician survey	Patient survey
Youth and young adults with chronic or complex physical conditions				
BMC	Boston Medical Center	X		X
NACHRI	National Association of Children's Hospitals and Related Institutions			
SCH	Seattle Children's Hospital	X	X	X*
UIC	The Board of Trustees of the University of Illinois	X		X
WI DHS	Wisconsin Department of Health Services	X	X	X
Adults with chronic conditions—high risk				
DMC	Detroit Medical Center, Vanguard Health Systems	X		X
FSCL	Four Seasons Compassion for Life	X	X	
NMC	The Nebraska Medical Center	X		X
Northwell	Northwell Health	X		
NYC H+H	New York City Health and Hospitals Corporation	X		X
U KS	University of Kansas Hospital Authority	X	X	X
UCSD	Regents of the University of California San Diego	X		X
UHCMC	University Hospitals Cleveland Medical Center	X		
Adults with chronic conditions—lower risk				
ACCF	American College Of Cardiology Foundation	X	X	
CCNC	Community Care of North Carolina	X		X
CHIIC	Catholic Health Initiatives Iowa Corp., dba Mercy Medical Center–Des Moines	X	X	X
FPHNY	Fund for Public Health in New York, Inc.	X		X
GWU	George Washington University	X		
Ventura	Ventura County Health Care Agency	X	X	X
VillageCare	Village Center for Care	X		X
People (adults, young adults, or children) with behavioral health or cognitive disorders				
Amerigroup	Amerigroup	X		
Clifford Beers	Clifford W. Beers Guidance Clinic, Inc.	X	X	
Hopkins	Johns Hopkins University	X		X
Montefiore	Montefiore Medical Center	X	X	X
UCSF	The Regents of the University of California, San Francisco	X		
Adults who are seeking or who recently received acute or sub-acute care				
CCC	CareChoice Cooperative	X		
Icahn	Icahn School of Medicine at Mount Sinai	X	X	X
Mesa	City of Mesa Fire and Medical Department	X	X	X
NHCHC	National Health Care for the Homeless Council	X		
UMich	Regents of the University of Michigan	X	X	
UNM	University of New Mexico, Health Sciences Center	X	X	
People (adults, young adults, or children) who need primary or preventive care				
AAMC	Association of American Medical Colleges		X	
Altarum	Altarum Institute	X	X	

Table V.2. *(continued)*

Acronym/ abbreviation	Awardee	Staff survey	Clinician survey	Patient survey
Avera	Avera Health	X		X
CHS	Children's Home Society of Florida	X		
Columbia	The Trustees of Columbia University in the City of New York	X	X	
U NC	The University of North Carolina at Chapel Hill		X	
Wash U	Washington University School of Medicine in St. Louis	X	X	X
Yale	Yale University	X		X

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APPENDIX A

EVALUATION CHALLENGES AND STRATEGIES FOR IDENTIFYING CREDIBLE COMPARISON GROUPS

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Obtaining valid impact estimates requires establishing credible comparison groups to represent what would have happened to the treatment groups in the absence of the intervention. We will be implementing a variety of approaches to overcome the many challenges involved in doing this. The approach that we ultimately use to select appropriate comparison groups depends on whether the intervention centers on providers or on patients. For provider-centered interventions, we will seek providers in comparable health care delivery systems (in terms of resources and organizational structure) in which the service delivery model can be applied with similar patients (in terms of demographics, medical conditions, and stage of disease or need for intervention services). For community- and patient-level interventions, we will seek a comparable group of patients to serve as the comparison sample.

Ideally, comparison groups should be similar to what would be produced by randomly assigning of patients eligible for the intervention so that the only pre-intervention differences between the two groups are due to random variation and are likely to be small. This situation would eliminate bias in our estimates of intervention effects and yield a known degree of confidence that the observed differences represent the actual effects of the intervention. As a practical matter when using quasi-experimental designs, we seek to establish comparison groups that are not significantly different from the treatment group on key observable predictors. A difference-in-differences approach provides some protection against differences between the two groups on unobserved factors, provided that the unobserved factors are relatively constant over time and have equivalent effects on the change in outcomes for the two groups.

Because our objective is to have two equivalent groups prior to the start of the interventions, we need to (1) select comparison groups by using propensity score methods to minimize the differences in key variables that are likely to affect outcomes of interest and (2) examine the magnitude of the differences between the two groups once the initial selection is made. In selecting the pool of patients or providers from which to draw our comparison cases, we first seek to understand whether the involved providers and their patients are typical of those in their area. If they are different, then we will look for similar providers in other areas for comparison and assess whether these providers and their patients can be identified in comparable ways, such as from observable practice characteristics and claims data. This requires a careful assessment of each awardee's situation in which we look at two things: (1) the nature of the process for recruitment and for the selecting the treatment groups and (2) how differences, including unobserved differences, could affect key outcomes. In each case, we will consider both the likelihood and the potential magnitude of any bias, as well as possible solutions.

Below we discuss the approaches we will use to establish effective equivalence of the treatment and comparison groups. For each approach, we provide some examples to illustrate how we will tailor the approach for defining a comparison group to the requirements of the situation for each awardee.

Defining the treatment group more broadly. In some cases in which program eligibility or selection criteria are highly judgmental or in which they involve elements not available in administrative data, it may not be possible to closely match the selection process and criteria used by the awardees with data (such as claims) that are comparable and available for the

comparison group. In addition, with some awardees, there is no formal enrollment, so the intervention effects must be measured for all beneficiaries who are potentially eligible for the program. In such cases, the best solution may be to define a treatment group somewhat more broadly than the group that receives intervention services in the treatment sites. We would accept results for somewhat broader groups in order to ensure comparable and unbiased estimates of the impacts. We would then compare the treatment and comparison groups that were similarly defined. These estimates will, however, understate the effects for those who actually receive services. To account for this, we will divide the estimated difference among eligibles by the participation rate for the treatment group.

One consideration with this approach is the need to select the eligible population so as to maximize the participation rate among patients and providers who are eligible for the treatment group. The sample size required to yield a particular minimum detectible difference for effects on those who are actually treated is equal to the sample size required when all treatment group members are participants divided by the square of the participation rate. For example, if only 50 percent of the expanded treatment group actually participated, and if the effects are concentrated only in that 50 percent, it would be necessary to detect an effect half the size in order to achieve the same precision. This requires a sample that is four times larger than is needed when all eligibles participate. This consideration may not be important with 80 percent participation. However, it presents a challenge if only 20 percent of eligible patients and providers participate. Thus, we may eliminate patients or providers from the evaluation-defined treatment group who have characteristics that very few actual program participants have (even though this would mean the loss of a small number of participants) in order to reduce the size of the "eligible" treatment group and increase the participation rate among this group. Doing this effectively requires good judgment and much knowledge about the target population and the intervention, but it is an essential part of this evaluation for many awardees. Conclusions about program effects would apply to the resulting treatment group as redefined. These estimated effects may differ from the effects that would have been observed if it were possible to exactly replicate the group receiving the intervention.

The following are examples:

- The American College of Cardiology expects to enroll beneficiaries by using a screening tool for cardiac risk. Similar data will not be available for potential comparison groups. Moreover, it is expected that the requirement to use the screening tool to determine appropriateness for enrollment into the program will deter the use of tests for those beneficiaries not expected to meet the appropriateness criteria. So, one intended outcome of the intervention is to avoid unnecessary testing. Thus, an important impact may be to reduce the use of tests needed to establish eligibility for the program. Therefore, for this awardee, we will identify treatment and comparison group patients in the same way—by using claims data. Specifically, we will select individuals who have (1) been diagnosed with chest pain, (2) received noninvasive cardiac imaging, or (3) visited a cardiologist—excluding those (more serious cases) that received cardiac catheterization without having had a noninvasive test. Until we examine the data, we will not know how much the evaluation-designated treatment group has to be increased beyond patients who are actually enrolled in the

program. Nor will we know until we conduct the evaluation the extent to which the intervention may have deterred the use of early testing prior to an enrollment decision.

- For Nebraska Medicine, we also plan to define the treatment group more broadly than the group that actually receives services (care management, telemedicine, and family engagement). This is because (1) we cannot capture many of the inclusion and exclusion criteria (for example, the ability to read English, use a glucometer, and operate the remote patient monitoring equipment) by using administrative data, and (2) we have no way of ascertaining which people in the comparison group would have refused treatment had it been offered to them. The treatment group will therefore be defined as Medicare beneficiaries residing in Douglas or Sarpy counties in Nebraska who were discharged from an inpatient stay at Nebraska Medicine with a primary or secondary diagnosis of Type 2 diabetes. The comparison group will be selected with propensity score matching (on characteristics and prior use patterns) from patients with a target diagnosis of Type 2 diabetes who were discharged from the six other general medical surgical hospitals in Omaha, Nebraska.

Obtaining additional data or constructing proxy measures for the comparison group. In some cases, we have approached the challenges presented by the inability to replicate treatment group criteria by obtaining data in addition to the claims data we are routinely obtaining for comparison groups. The following are examples:

- Cleveland Medical Center is enrolling late-stage cancer patients into its intervention to improve clinical outcomes and decrease costs. Because cancer stage is not easily or accurately identifiable with claims data, we have obtained cancer staging information for all patients diagnosed with cancer from Ohio's cancer registry, which we will match with claims data in order to construct a comparison group of late-stage cancer patients.
- Seattle Children's Hospital has a treatment group that was identified by using criteria from the PRISM tool to identify high-risk children. PRISM scores will not be available for comparison group children. Therefore, in evaluating this awardee, we will use one of two possible strategies to identify higher-risk children for the comparison group. The first strategy, which is our preferred strategy, will be to develop proxy PRISM scores by using available claims data for the treatment group. If the original PRISM scores and the proxy PRISM scores are strongly positively correlated, we will select comparison group children who have proxy PRISM scores that match closely to a treatment group child's predicted PRISM scores. Otherwise, the second strategy will involve applying the Pediatric Medical Complexity Algorithm categories to select comparison group members in order to approximate enrollment into the awardee's program. This strategy will approximate most but not all of the PRISM criteria, and it will lead to an expansion of the cases included in the "treatment" group.

Selecting comparison organizations. The HCIA R2 awardees make up a diverse set of organizations, many with distinct or even unique characteristics. Replicating the institutional environment for comparison groups, therefore, presents some challenges. Our objective is to ensure that the comparison group is as similar as possible to the treatment group in both the types of patients and the organizational settings in which the interventions operate. In some cases, we

can accomplish this by selecting comparison group sites within the same health care system or same geographic locations (city or state) in which the interventions operate. In other cases, it will be necessary to seek comparison groups in nearby markets or states with similar characteristics for both the delivery system and participating organizations.

Our strategy will be to select comparison groups so as to minimize the risk of bias in our impact estimates, such as Medicare costs, readmissions, or other awardee-specific outcome measures relevant to the intervention. This approach may create trade-offs between the sources of risk, such as the following:

- Risk of the intervention affecting (contaminating) non-treatment-group patients in the local market (for example, from effects on care delivery patterns)—meaning that a high market share of treatment providers may preclude a within-market comparison group or may saturate services to a finite local target population.
- Risk of distinct market characteristics—meaning that comparison groups in other markets may face distinct trends in, or rates of, cost change because of local payer policies or because major providers in the market adopt cost-saving or more costly technology. Practice patterns may also differ across markets, as documented in numerous studies by Dartmouth College researchers and others, because of the influence of local medical societies and other factors.
- Risk of state-specific financing or programs—meaning that selecting comparisons from states other than the treatment state means that the comparison group will not be subject to the same statewide forces that affect trends in outcomes, which may be particularly important for awardees that target Medicaid beneficiaries or beneficiaries in other state and local programs.
- Risk of distinctly changing practice styles—meaning that treatment and comparison practices, even without the intervention, may be changing their patterns of care at different rates in ways that may or may not be related to practice size, specialty mix, age of practitioners, maturity of data systems, use of supporting personnel, or participating in one of CMS's alternative payment models, such as an accountable care organization or comprehensive primary care.

In general, we prefer to use within-system and within-state comparison sites when feasible, but in many cases, the remaining candidates for comparison groups may not be similar to treatment group beneficiaries in all important characteristics. This is particularly true if the intervention is affecting a large share of patients or providers within the system or state. In such cases, we will look for comparison providers with matching characteristics in adjacent locations with similar health system environments and with comparable baseline trends in outcomes. The following are examples:

- For Montefiore Medical Center, we may use nonparticipating sites within the Montefiore system for all or part of the comparison group, as well as sites not owned by Montefiore. These Montefiore sites appear to have comparable within-system practices that would not be contaminated by the intervention. All of Montefiore's sites provide comprehensive medical

care services in a wide range of medical specialties, and all serve many age groups. However, we will need to speak with the awardee about the characteristics and organizational relationships of each site to make sure that each nonparticipating site is appropriate for the comparison group. Typical of quasi-experimental designs, the results could be biased to the extent that we may not be able to control for all unmeasured differences between participating and nonparticipating sites. Such biases could arise from Montefiore Medical Center's participating sites being selected, or self-selecting, because they are more advanced and ready to change than are nonparticipating sites, or they may have already started some aspect of the intervention. However, using Montefiore Medical Center's sites improves the comparison group because practices within the awardee's system are more likely to be similar to each other (in terms of health IT use and practice patterns) than to other potential comparison practices. Moreover, using the Montefiore Medical Center practices allows us to control for patient characteristics and clinical information available in the EMR system; such information would not be available if we used practices not owned by Montefiore Medical Center.

- The American College of Cardiology has involved organizations that dominate the market and that represent most cardiology practices in Wisconsin, but the treatment group practices represent a much smaller share of the market in Florida. This enables a within-state comparison group in Florida. However, in Wisconsin, we will need to find comparison practices in comparable areas in surrounding states (including, downstate Illinois [outside Chicago and suburbs], Iowa, Michigan, and Minnesota).

Overall, we are reasonably confident that by giving attention to the types of evaluation issues illustrated in the examples above, we can establish a comparable comparison group needed to support a difference-in-differences analysis for the majority of the awardees' programs. We will continue to refine our strategies for estimating program impacts by addressing the distinct challenges presented by each awardee to identifying a credible comparison group. As data become available, it will be necessary to ascertain how well we can match patients and providers on observable characteristics, including prior utilization experience. The results of these efforts will be reported in forthcoming quarterly and annual reports.

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APPENDIX B

INDIVIDUAL AWARDEE PROGRAM NARRATIVES

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APPENDIX B.1.

ASSOCIATION OF AMERICAN MEDICAL COLLEGES

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MATHEMATICA Policy Research

REPORT

APPENDIX B.1

HCIA Round Two Evaluation: Association of American Medical Colleges

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Coordinating Optimal Referral Experience (CORE) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Association of American Medical Colleges' progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Association of American Medical Colleges made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the Association of American Medical Colleges and its sites addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the Association of American Medical College's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CORE program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the clinician survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Association of American Medical Colleges is supporting five large academic medical centers (AMCs) in implementing CORE, which is an eConsult and eReferral (eCR) program. The University of California San Francisco Medical Center (UCSF) first designed and piloted this program to reduce long wait times for specialty appointments as well as to increase the effectiveness of referral processes by improving communication and care coordination between primary care physicians (PCPs) and specialists. An eConsult is an electronic exchange initiated by a PCP who is seeking clinical guidance from a specialist for patients whom the PCP would like to continue to manage. The eConsults are meant to replace some in-person specialist visits. The consulting specialist is expected to respond to the eConsult request within 72 hours.

If the consulting specialist feels that the patient should be seen in person, he or she can convert an eConsult to an eReferral for an in-person visit. The eReferral template was designed to enhance the referral pathway. The eReferral includes information to indicate how the specialist and PCP will proceed with caring for the patient. PCPs must choose between options that state whether (1) the eReferral is a one-time visit, (2) the PCP expects to be comanaging the patient with the specialist, or (3) the specialist will be solely managing the patient. The eReferral includes a series of questions to ensure that the PCP provides all necessary information to the specialist—such as, what is the basic clinical history for the patient's condition and whether the PCP has completed certain key diagnostic and laboratory tests. Once the PCP sends the eReferral, an appointment is scheduled for the patient.

With the CORE program, which was launched on September 1, 2014, the awardee is aiming to make specialty care more accessible by reducing specialist physician visits for conditions that can be managed with consultation in primary care. The CORE program relies on health information technology (health IT). Both the eConsult and eReferral platforms are embedded within the EpicCare electronic medical record (EMR) system (made by Epic Systems Corporation), which is used by all participating AMCs. However, the versions and features of the Epic EMR vary across participating AMCs. The awardee has supported customization of the tools to match technical requirements, as well as site-specific variations in workflows. The CORE program is overseen by the awardee's staff, at its headquarters in the District of Columbia, who provide training and support to each of the five participating AMCs that are implementing the program. In particular, training and support are provided to site-specific PCP leads, who are PCP faculty members designated as program champions and points of contact for the CORE program.

The primary targets of the CORE program are PCPs, who are introduced to and encouraged to use the eConsult and eReferral tools at participating sites. The program also serves primary care clinics whose providers are employed by the five participating AMCs—including both community-based and AMC-based clinics—provided that those clinics also use the EpicCare EMR. The target patient population includes all patients older than 17 years of age, regardless of payer status, who visit the primary care practice sites. The awardee estimates that the program will indirectly serve 125,000 patients. A change in patient behavior—such as a reduction in visits to the emergency department (ED) that are due to poor access to specialists—is an anticipated secondary, indirect effect of the program.

Each participating site is required to launch eConsult templates for 15 specialties. The awardee implemented the CORE program in a series of four or more waves, with sites introducing a certain number of specialty-specific eConsult and eReferral templates in each wave. This approach allowed primary care and specialty physicians at participating sites to continually review, customize, and refine the clinical content of the eConsult and eReferral template in each of the specialty areas.

In the second year of the program, the American Association of Medical Colleges explored a fee-for-service (FFS) payment model in which the specialists responding to eConsults would bill by using interprofessional Current Procedural Terminology (CPT) codes.[2] PCPs requesting the eConsults would bill with prolonged service CPT codes under a CMS waiver, if the PCPs participated in a larger alternate payment model (APM). The model does not directly include payment for using the eReferral templates. The awardee is also exploring a process for assigning relative value unit (RVU)[3] credits for completing an eConsult.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Association of American Medical Colleges during the first year of its cooperative agreement.

- All five sites were on track to go live with the remainder of their 15 specialty-specific eConsult and eReferral templates by the end of calendar year 2015.
- The Association of American Medical Colleges developed a tracking and monitoring system to support site-level implementation.

We also identified several initial challenges in implementing the program and the Association of American Medical Colleges' strategies for addressing them.

- At one of the sites, there was insufficient site-level leadership engagement during the early stages of implementation. To address this, the awardee worked closely with the site to support local leaders and leveraged lessons learned during implementation from other sites.
- Because of the inability to remove standard pathways for referrals at some sites, PCPs continued to use the standard referral process instead of the eReferrals that are part of the intervention. To address this, three sites required that all participating specialties use the enhanced referral templates. The remaining sites were working to make the eReferral pathway a requirement.

[2] A new set of codes to report interprofessional (doctor to doctor) telephone or online consultation was introduced in 2014.

[3] RVUs are a measure of physician work often used in systems for paying physicians. See "How Medicare Pays Physicians," *The New York Times,* December 3, 2010. Available at http://economix.blogs.nytimes.com/2010/12/03/how-medicare-pays-physicians/?_r=0.

Finally, we identified several early lessons learned by the Association of American Medical Colleges in implementing its program.

- The phased approach for launching specialty templates streamlined the implementation process and allowed sites to (1) continually refine workflows and (2) improve the quality of eConsults and eReferrals while adapting them to local needs.
- Use of a common EpicCare EMR system across the participating sites facilitated the sharing of resources and expertise.
- The perceived educational benefits of the CORE program facilitated both specialist and PCP support.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Association of American Medical Colleges made progress in the following areas:

- All five sites have launched the eConsult templates for the required 15 specialties. In addition, more than half of the participating sites have gone beyond or plan to go beyond the 15 specialties.
- Four of the five sites now have enhanced referrals as the only pathway for referring patients to a specialist.
- After facing obstacles in pursuing a shared savings approach for its payment model, the awardee has identified a new payment model that builds on existing infrastructure such as CPT codes and APM waivers. The Association of American Medical Colleges is working with the American Medical Association's (AMA) Specialty Society Relative Value Scale Update Committee (RUC) in developing the RVU components of this model.

Over the past year, the Association of American Medical Colleges also made some minor changes to its program:

- Sites have made minor site-specific changes to better integrate the tools into their clinical workflows. For example, one site created a fail-safe in the eConsult tool so that if a medical resident sent an eConsult and forgot to add the attending PCP, the tool would automatically copy both the resident and the attending PCP listed on the patient's chart. Beyond these minor site-specific changes, the awardee has not made any major changes to the program design or tools in the last year.

Below we note the key challenges that the Association of American Medical Colleges has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Some participating sites faced continued delays in launching condition-specific templates for their final specialties because of the complexity associated with requiring images for specialties such as dermatology. The delayed sites are either launching image capturing tools within their EMRs or are working with their AMC leaders to identify other potential solutions.

- Some participating sites faced challenges with engaging some PCPs, including providers at community-based practices, in using the eConsult and eReferral tools. To further improve provider uptake of the tools, site-level leadership at one of the sites made in-person visits to each of the community-based practices, which allowed the PCPs to ask specific questions and to walk through the tool with the PCP lead.
- One of the awardee's operational milestones is to achieve 80 percent uptake of the enhanced referral templates across all sites. However, the awardee continues to encounter challenges to achieving this milestone because some PCPs at some of the sites perceived the templates as inefficient and cumbersome to complete. The awardee reported that sites were working on standardizing and streamlining their eReferral condition-specific templates.

As the Association of American Medical Colleges enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Although streamlining the eReferral templates will help to increase uptake of the eReferral tool and allow for more efficient consultation visits, engaging busy PCPs and specialists to provide feedback on the current templates will be challenging.
- Development of the new payment model approach depends upon the awardee's ability to modify existing physician CPT codes or to identify potential waivers so that eConsult payments can fit into APMs. The awardee plans to work with the AMA's RUC to receive guidance on CPT coding options for existing CPT codes that could support reimbursement for both specialists and PCPs.

Table 1. Association of American Medical Colleges: CORE characteristics at a glance

Program characteristic	Description
Purpose	The Association of American Medical Colleges (AAMC) has implemented the CORE program to enhance care delivery at the primary care–specialty care interface by providing PCPs with decision-support tools that allow them to seek guidance about patient treatment and assess the appropriateness of specialist clinician referrals.
Components	Outpatient care coordination, decision support, health IT
Target population	The primary targets of the program are PCPs, who are introduced to the eConsult and eReferral system at participating sites.
Theory of change/theory of action	AAMC hypothesizes that combining improved coordination and communication between PCPs and specialist clinicians with the eConsult interface will lead to a reduction in unnecessary subspecialty referrals and visits, more efficient use of specialist care, and improved access to specialists.
Payment model	New FFS payment and per beneficiary per month (PBPM) payments
Award amount	$7,125,770
Launch date[a]	9/1/2014
Setting	Primary care practices, hospitals, AMCs
Market area	Rural, urban, suburban
Market location	CA, DC, IL, IA, NH, VA, WI
Core outcomes	• Increase in patient satisfaction, measured by the Clinician and Group Consumer Assessment of Healthcare Providers and Systems Survey • Decrease in ED utilization, measured by ED visit rate • Decrease in cost, measured by a total cost of care, population-based, per beneficiary per month index • Decrease in utilization, measured by all-cause inpatient admission rate • Decrease in utilization, measured by referral rate • Increase in quality of eConsults, measured by referral rate • Decrease in cost, measured by diagnostic testing and imaging • Increase in eConsult uptake, measured by eConsult rate • Increase in access, measured by timely access to specialty care • Decrease in cost, measured by costs to patient (estimated)

[a]After the initial planning period, the awardee's program began to operate as of this date.

AMC = academic medical center; ED = emergency department; FFS = fee-for-service; IT = information technology; PCP = primary care physician.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Association of American Medical Colleges in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 14, 2016, through July 25, 2016. For the analyses of the Association of American Medical Colleges' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Project director at the Association of American Medical Colleges
- PCP leads
- Faculty lead
- Executive sponsor
- eConsult specialist users

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

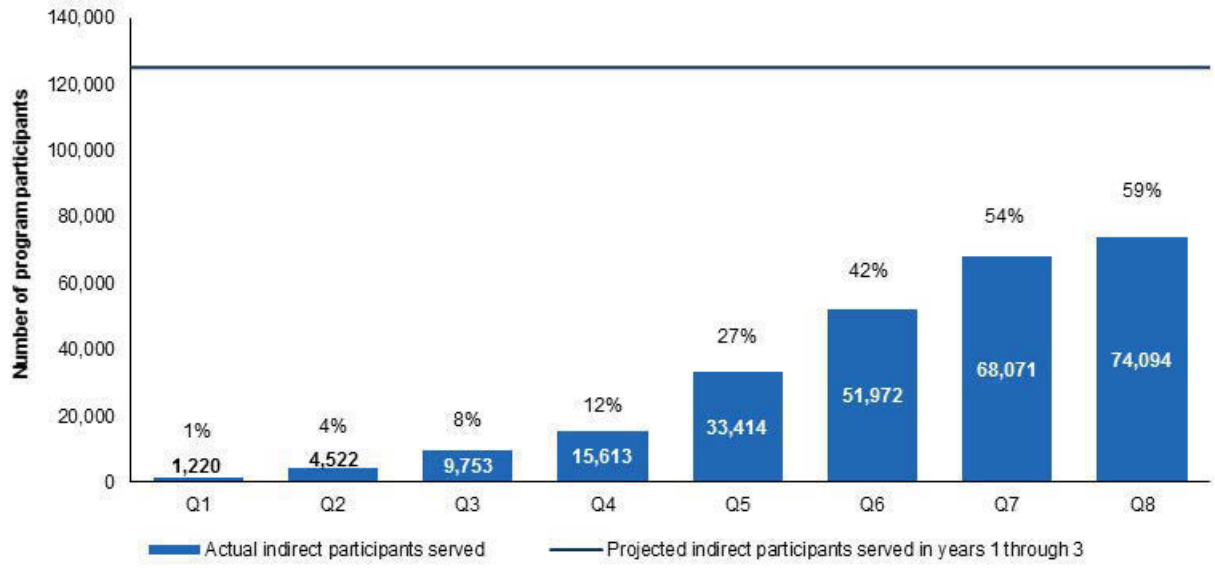
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the Association of American Medical Colleges' implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the Association of American Medical Colleges reported to the implementation and monitoring contractor that it indirectly served 74,094 participants from September 2014 (the launch of its program) through August 2016, which represents about 59 percent of its 125,000 projected indirect participants (Figure 1).

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–October 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. AAMC does not have direct participants.

The success of the CORE program hinges on PCP and specialist engagement and voluntary use of the eConsult tool, as well as appropriate use of the eReferral tool. The partner AMCs have physician compensation plans in place that reward productivity. These plans provide RVU credits and monetary reimbursement to incentivize participation in the CORE program. Specialists receive compensation in recognition for the time and effort needed to complete each eConsult. The PCPs receive an RVU credit for both the time and effort expended in initiating the eConsult and for carrying out the specialist's recommendations.

After a steady increase of PCP use in the beginning of the program, implementing sites are now experiencing slower uptake of the eConsult tool. Through the first three quarters of Year 2 (quarter 5 to quarter 7), 63 percent to 87 percent of PCPs across the sites had used the eConsult tool at least once. Although this number may seem high, site-level staff indicated during interviews that they were seeing a slower increase in new or continuous PCP engagement. The reason for this may be that PCPs may see the tools as one more activity that they have to add

to their busy schedules or they may not be familiar with the tool's functional capabilities. Sites are leveraging various engagement strategies to address this challenge and encourage participation. Because many community-based clinics face specialty access issues, the participating sites are leveraging their data to identify and focus outreach on the community-based clinics that have low utilization of the eConsult tool. At one participating site, the PCP lead visited some of the community-based clinics to demonstrate the eConsult tool and walk through potential questions that could be asked in an eConsult. Providers at the clinics expressed their appreciation for the PCP lead's in-person presentation (versus sending an email explaining how the tool functions). After the visits, the site saw a slight increase in the use of eConsults at the clinics.

AAMC continued using comanagement conferences to engage providers. During comanagement conferences, specialists attend a meeting with a group of PCPs to talk about shared care plans for common patients and identify opportunities for improving communication and coordination that might be facilitated by the eConsults or eReferrals. Additional engagement strategies used by participating sites included one-on-one conversations between PCP leads and their fellow colleagues or presentations during grand rounds or faculty meetings. One barrier noted during interviews was that PCP leads had limited time in their day allocated to the project, so when stretched for time they may prioritize other program activities over in-person or one-on-one outreach to PCPs at their sites who have not yet used the eConsult tool. The Association of American Medical Colleges did not identify a solution for this barrier that could be generalized across sites. As another engagement tool, sites email newsletters that highlight exemplary eConsult questions. However, one of the sites noted that the rate at which these newsletters were being opened had decreased over the past few months. Staff attributed this to providers being overwhelmed by how many emails they receive. To address this, the site is looking into developing a website to highlight a wider array of exemplary questions and to provide a comprehensive overview of the CORE tools.

One of the awardee's operational plan milestones is to achieve 80 percent uptake of the enhanced eReferral templates across sites. The main barrier to achieving this goal has been the challenges with switching from the standard to the enhanced referral pathway. As mentioned in the first annual report, some sites have required use of enhanced referrals across all specialties within the AMC, so now the enhanced referral is the only option that can be used to refer a patient to a specialist. For those four sites that only have the enhanced referral pathway, a new challenge that has arisen is the PCPs' dissatisfaction with the design and quality of the eReferral templates, which has discouraged them from using the templates in their entirety. This challenge is discussed in greater detail below.

B. Implementation of the service delivery model

Implementation progress at participating sites is progressing mostly according to the awardee's original plan despite some unexpected delays. All five sites have implemented the model across a minimum of 15 specialties; a subset of sites is continuing implementation with additional specialties beyond the required 15. In this section, we identify some of the key facilitators of, barriers to, and strategies used by the Association of American Medical Colleges and site-level staff to implement the program's service delivery model in Year 2 of the grant.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Site-level staff continue to see the value of using the eConsult tool. The implementing sites reiterated their opinion that the eConsult tool is an improvement over their old workflows and helps to improve the culture of collaboration between PCPs and specialists at their sites. Site-level staff believe that the ease involved with using this tool allows for its incorporation into their current workflows. Interviewees at one site noted the straightforward design of the tool, which was aided by a smooth implementation, as one of the main reasons they do not plan to update the eConsult specialty-specific templates.

PCPs are less impressed with the eReferral templates and have described difficulties associated with using the tool. As a result, some sites are seeing low usage of the eReferral templates. At the start of implementation, PCP leads at some sites let the specialists dictate the content of the templates, which in some cases included superfluous information. Other sites let their Epic teams program and design the templates without adequately testing their usability. In addition, some participating sites rushed through template development to meet implementation deadlines. As a result, PCPs have remarked that the templates are inefficient, require more information than necessary, and take a long time to complete. In some instances, PCPs have found a way to circumvent entering the required patient information, submitting mostly blank eReferrals that contain only requests to refer their patients. This defeats the purpose and function of the enhanced referral. PCP leads at the sites noted that in the next couple of months they will be focusing on streamlining and improving the eReferral templates to address PCPs' feedback and concerns.

Local adaption of the eReferral tool into clinical workflows has led to some specialists not reviewing the additional medical documentation in the referral templates before seeing the referred patient. Some specialties at the implementing sites have incorporated the enhanced referral at the scheduling or nurse triage stage of their workflow, which is a step that does not include the specialist. As a result, a number of specialists do not know about or are rarely reviewing the information populated in the templates. The Association of American Medical Colleges acknowledged that a single solution will not work for each site because the workflows for each specialty are different. However, the awardee has made a suggestion based on UCSF's

experience with the same issue. UCSF developed programming language within Epic's Cadence scheduling module so that the enhanced referral information pops up in the corner of the screen when the specialist looks at his or her patient appointment schedule and floats the cursor over a patient's name. The awardee is working with four out of the five sites who have the Cadence module in their EMR system to incorporate this solution. To further ensure that this solution has its intended result, specialists will have to opt out of this option in Epic.

> "We're going have to end up going to each division to be like, okay, what's the workflow for you guys looking at a referral? What are you looking at? And where can we put this information so that you see it and you know that it's there? 'Cause right now, I don't think any of our specialists—even our eConsult specialists when they see people in clinic—I don't think they're looking for an enhanced referral."
>
> *— PCP lead*

The language in the eReferral templates regarding comanagement has caused confusion and frustration among PCPs. The language that is placed at the bottom of an eReferral template is used to indicate how the specialist and PCP will proceed with caring for the patient. PCPs must choose between options that state whether the eReferral is a one-time consultation, the PCP expects to be comanaging the patient with the specialist, or the specialist will be solely managing the patient. Interviewees from participating sites commented that the care management language was awkward and confusing. One eReferral user felt that the question was unnecessary because the comanagement relationship should be established by the specialist, because the PCP would not be sending an eReferral if the PCP knew what was needed from the specialist. Sites are now working on developing new site-specific language that more clearly outlines expectations about how the patient's care will be managed.

2. Implementation processes

The implementing sites have shifted their focus from implementing the CORE tools to improving the quality of the tools. The sites are working on standardizing and streamlining their condition-specific templates to address (1) variations in how the templates were adapted within the site and (2) the extent to which clinical guidance and required laboratory or diagnostic tests have been incorporated for each specialty. Many sites are prioritizing the streamlining of the condition-specific eReferral templates to address PCP feedback and concerns. Site-level staff noted that this activity would take anywhere from six months to over a year to complete because the process involves going through 15 or more specialties and updating a number of condition-specific templates within each specialty. The challenge with this activity will be capturing feedback from busy specialists and PCPs because gathering everyone in the same room at the same time has proven to be difficult in the past. One eConsult user believes the challenge of capturing feedback from PCPs and specialists also points to the difficulty in engaging providers without giving them support for their time and effort. Sites will implement different strategies to address this challenge, such as capturing feedback by email if stakeholders can't attend in-person meetings or working with the chief medical informatics officer on a robust user experience testing plan to get more feedback on how to enhance the tool.

Changes in staffing at one site have led to a slight increase in new users. At one implementing site, there was a transition in the PCP lead. During this transition, the previous lead stayed on a couple of months after the new lead started her new role. This helped to educate

> "If I am a family practice faculty and someone from internal medicine comes and tries to demonstrate something new compared to… someone who does the exact same job that I am doing who says, 'Yes, I use this in my practice. It is very helpful.' There is going to be better reception."
>
> — *PCP eConsult user*

the new PCP lead about the responsibilities and expectations for the role and led to a smooth handoff when the transition was finalized. The new PCP lead was approached because she was a high utilizer of the eConsults and had a vested interest in the program. The new lead's belief in the program has made the lead effective at recruiting other practices, which the site was previously behind on. At this same site, the program hired a family medicine doctor to serve as a facilitator to increase eConsult use in that department. Having someone who is familiar with both the tool and the inner workings of the family medicine department has helped demonstrate the utility of the tool and led to increases in its use.

Program leaders at the Association of American Medical Colleges continue to provide support and guidance as the sites progress through the second year of the grant. The Association of American Medical Colleges conducted in-person visits at four of five implementing sites to assist site-level staff in identifying and developing quality improvement plans to (1) enhance the user experience and increase provider uptake of the model; (2) review current program data to identify opportunities for improvement and expansion of the model; and (3) begin to identify, with site-level leaders, opportunities for scaling and sustaining the program. During one of these visits, the Association of American Medical Colleges was able to work with the AMC's chief medical information officer to address resistance from the site-level staff and from the Epic team about making updates to the templates. In addition, Association of American Medical Colleges leaders met with executive leaders at participating sites to discuss strategies for sustaining the program. The awardee also provides opportunities for site collaboration and feedback during a monthly collaborative meeting, which is attended by staff from all sites. Two PCP leads reported that because of these calls they've identified opportunities to improve PCP user experience of the tools. These two leads launched a two-question survey at their sites that asked PCPs whether they had used an eConsult and if not to state the reasons for not using the tool. The two sites will use the feedback from this survey to inform their PCP outreach strategy.

Recognizing the important role patients may play in developing the payment model and enhancing the program, the Association of American Medical Colleges has launched focus groups and a survey to capture patient feedback. The Association of American Medical Colleges also used the site visits to conduct patient focus groups to understand more about the patient experience when providers use eConsults and eReferrals. In addition, the awardee launched a monthly patient survey in April 2016, which will help it compare patient perspectives among those who received an eConsult and those who received a referral. One challenge with the survey is that one of the sites does not have an account with the survey tool developer, and this additional cost is not in its budget. The site is working with the Association of American Medical Colleges to identify alternative tools and platforms to field the survey. The Association of American Medical Colleges believes that the survey will provide sites with data on patient satisfaction with the tools that will help them negotiate with their local private payers. However, one respondent noted that it may be difficult to capture patient feedback because patients often do not know that an eConsult or eReferral is being submitted on their behalf.

Implementing sites are completing their own data analysis and evaluating how the data can be used, to make the case for sustaining the program. Sites are taking different approaches in identifying which data to use to help demonstrate the value of the eConsult tool. Site-level staff at one site have worked with their financial team to engage their leadership team and demonstrate the cost savings achieved through this program. The staff believe that cost savings data are a more tangible argument for sustainability. Staff at another participating site are concerned that the lack of demonstrated cost savings will serve as a potential barrier to justify the continuation of the program. These staff believe that the lack of cost savings is largely due to the fact that the AMC is a low-cost health system, so it experiences fewer savings on each patient specialist visit. Site-level staff are working to address this concern by using data showing how the program has increased access to many of their specialists, which they believe will help convince Medicare of the program's value.

3. Organizational and external context

Program implementation can be influenced by the structural, political, and cultural characteristics of the implementing organization and by the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

The external context that influenced the implementation of the CORE program includes feedback from a national telemedicine organization. The American Telemedicine Association issued a statement recommending that when dermatologists provide virtual care, images should be a required element to provide more effective care. As a result, the sites where the dermatology department is participating in the program requested images to be included with the eConsult. This request has delayed the launch of dermatology at two sites. For one site, the dermatology template launch was delayed until summer 2016 while the site tested a new image capturing system. The second site does not have image capturing capabilities within its EMR, so site-level staff are awaiting feedback on and next steps about image capturing from the AMC's leaders.

C. Development of the payment model

In the first annual report, we described the Association of American Medical Colleges' shared savings approach for its payment model. Through internal discussions with partners and subsequent research, the awardee realized that there was not a precedent for paying two providers when only one provider was actually seeing the patient—so, initial thoughts about developing a shared savings model were sidelined. Since then, the awardee's payment model has evolved. The Association of American Medical Colleges is now developing a new FFS payment model in which the specialists responding to eConsults would bill by using existing interprofessional CPT codes. PCPs requesting the eConsults would bill with prolonged service CPT codes under a CMS waiver, if the PCPs participated in a larger APM. Although this approach would leverage existing payment arrangements, the challenge with this model is determining how to modify the existing CPT codes and identify a waiver that will work with large APMs. The Association of American Medical Colleges identified alternate options for paying PCPs for their eConsult services, such as including eConsults as a qualifying service for care coordination under an existing demonstration project (for example, Comprehensive Primary Care Plus). This option would incentivize PCPs to use eConsults to be eligible for participation in demonstration projects.

The awardee met with the AMA's RUC. This committee suggests and recommends RVU values to CMS. The Association of American Medical Colleges has been collecting data about time-based codes at most of its participating sites and would like to share and discuss the findings with the RUC. The Association of American Medical Colleges is hoping the discussions will help inform a process for assigning RVUs for completing an eConsult.

The awardee started engaging its steering committee, which is made up of executive sponsors from each of the sites, and working on a targeted plan to approach private payers in the upcoming year. Awardee leaders will review each site's data and any additional information needed to assist in negotiations with private payers. The goal is to replicate UCSF's experience, in which UCSF persuaded a private payer to pilot a reimbursement system for the eConsults and to assess the impact of the tool.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents a summary of the baseline characteristics of the treatment group, measured during the 12 months before the enrollment date for each beneficiary who visited a primary care clinic within a participating AMC network. For the purpose of our evaluation, the treatment group consists of individuals who visited primary care clinics that were exposed to the eCR program and were part of a participating AMC network: (1) Dartmouth-Hitchcock; (2) the University of California, San Diego; (3) the University of Iowa; (4) the University of Virginia; and (5) the University of Wisconsin.

A. Baseline characteristics of the treatment group

The five participating AMC networks launched their eCR programs in September 2014. By the end of May 2016, 102,558 Medicare beneficiaries had visited one of the 1,320 primary care providers identified by the awardee as participants in the program. Subsequently, 11,494 beneficiaries were excluded from the analysis because they were not enrolled in Medicare fee-for-service (FFS).

In presenting baseline characteristics for this report, we restricted the treatment group to Medicare beneficiaries who (1) visited primary care physicians associated with the five AMCs after September 1, 2014; (2) were enrolled in Medicare FFS, Parts A and B, with Medicare as the primary payer at the time of their enrollment date with one of the five AMCs; (3) had met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment); and (4) who could be identified in the Virtual Resource Data Center's Medicare health insurance claim-to-beneficiary ID crosswalk. The calendar period covered by the baseline quarters is determined by the enrollment date for each participant and therefore varies by participant. After excluding 4,078 beneficiaries who were not enrolled in Medicare FFS and 7,416 who were not enrolled for at least 90 days prior to the program enrollment date, we included a total of 91,064 participants in the analysis of baseline characteristics for this report.

Our analysis of baseline demographic characteristics (Table 2) indicates that compared to the general Medicare population, the Medicare FFS beneficiaries who saw a participating primary care physician have similar age and sex composition but include smaller percentages of Hispanics and African Americans.[5] In terms of reasons for Medicare eligibility, the proportion of patients in the treatment group with disability insurance benefits is higher than the one for all Medicare beneficiaries, while the hierarchical condition categories (HCC) score of program participants is also higher than the national average, with a mean of 1.28.

Table 3 shows baseline expenditure and utilization data for a common set of measures for the four quarters prior to enrollment. The higher-than-average HCC scores are consistent with the high total Medicare expenditures per beneficiary per month (PBPM) shown in the table.

[5] See http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf?sfvrsn=0.

On average, the PBPM expenditures for the treatment group during the 12 months before enrollment were $1,109—higher than the national average Medicare expenditure of about $790 per month. Multiple spending categories drove the high costs, including inpatient ($472 PBPM), outpatient ($247 PBPM), and physician services ($206 PBPM).

Fourth-quarter expenditures, spanning the three months before enrollment, were higher than earlier quarters ($1,621 PBPM in the fourth quarter). In this quarter closest to enrollment, average expenditures were highest across most expenditure categories—and notably so for acute inpatient ($848 PBPM and 80 percent higher than the 12-month average), physician services ($246 PBPM and 19 percent higher than the 12-month average), outpatient ($271 PBPM and 10 percent higher than the 12-month average), and skilled nursing facility ($102 PBPM and 42 percent higher than the 12-month average).

Increases in measures of utilization accompanied the rise in fourth-quarter expenditures, with the exception of primary care visits. The average rates per 1,000 beneficiaries over all 12 baseline months included 358 acute hospital admissions; 610 outpatient ED visits; 65 observation stays; and 8,536 specialist visits. The rates of utilization were highest for the enrolled population in the quarter closest to enrollment across all the utilization types listed above. Rates of acute hospitalization, outpatient ED visits, and observation stays in the fourth quarter were 54 percent, 24 percent, and 29 percent higher, respectively, than the 12-month averages. Similarly, the percentages of beneficiaries with a hospital admission (10 percent), an outpatient ED visit (13 percent), or an observation stay (2 percent) are the highest in the quarter closest to enrollment, in comparison to the three previous quarters. The increases in these utilization measures suggest that the enrolled patients were incurring hospital-related charges just prior to the enrollment event.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 91,064)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	16,927	19
65 to 74	41,745	46
75 to 84	22,315	25
85 and older	10,077	11
Gender		
Female	51,993	57
Male	39,071	43
Race		
White	80,579	88
Black	5,503	6
American Indian, Alaska Native, Asian/Pacific Island American, or other	2,788	3
Hispanic	803	0.88
Original reason for Medicare eligibility		
Old age and survivor's insurance	67,509	74
Disability insurance benefits	22,332	25
End-stage renal disease (ESRD)[a]	1,223	1
Hospice[b]	291	0.32
Medicare/Medicaid dual status, percent dual[b]	15,844	17
HCC score[c]		Statistic
Mean		1.28
25th percentile		0.47
Median		0.81
75th percentile		1.48

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 12 months before each beneficiary's enrollment date. The enrollment date is defined as the date on which we first have evidence that a beneficiary received a service at a participating facility between 9/1/2014 to 5/31/2016. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	91,064	84,897	87,444	90,792	91,059
Average Medicare expenditures PBPM[a]					
Total	1,109 (10)	888 (14)	907 (12)	986 (32)	1,621 (20)
Acute inpatient	472 (7)	319 (11)	333 (8)	364 (31)	848 (15)
Inpatient other[b]	46 (2)	29 (3)	34 (2)	41 (3)	77 (4)
Outpatient[c]	247 (3)	232 (3)	233 (3)	249 (3)	271 (3)
Physician services	206 (2)	192 (3)	184 (2)	200 (2)	246 (3)
Home health	31 (<0.5)	27 (1)	29 (1)	30 (1)	37 (1)
Skilled nursing facility	72 (1)	56 (2)	61 (2)	68 (2)	102 (3)
Hospice	10 (1)	7 (1)	8 (1)	10 (1)	13 (1)
Durable medical equipment	25 (1)	25 (1)	25 (1)	25 (1)	26 (1)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	358 (3)	278 (7)	285 (7)	302 (17)	552 (6)
Outpatient ED visits	610 (7)	537 (9)	549 (9)	586 (10)	756 (10)
Observation stays	65 (1)	58 (2)	55 (2)	60 (2)	84 (2)
Primary care visits in any setting	4,864 (21)	4,961 (28)	4,836 (28)	4,904 (38)	4,745 (32)
Primary care visits in ambulatory settings	4,049 (15)	4,345 (21)	4,176 (21)	4,183 (24)	3,509 (19)
Specialist visits in any setting	8,536 (43)	7,894 (51)	7,878 (51)	8,318 (91)	9,933 (72)
Specialist visits in ambulatory settings	6,293 (27)	6,249 (34)	6,178 (34)	6,403 (50)	6,311 (32)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	21 (< 0.5)	6 (< 0.5)	6 (< 0.5)	6 (< 0.5)	10 (< 0.5)
Percentage with an outpatient ED visit[e]	29 (< 0.5)	9 (< 0.5)	10 (< 0.5)	10 (< 0.5)	13 (< 0.5)
Percentage with an observation stay[f]	6 (< 0.5)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)	2 (< 0.5)
Percentage with a 30-day readmission among all discharges	19 (< 0.5)	18 (1)	18 (1)	18 (< 0.5)	20 (< 0.5)
Percentage of participants with a readmission among all participants	3 (< 0.5)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. The participant's enrollment date is defined as the date of the first Medicare-covered visit after the start date of the physician's participation in the project. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Association of American Medical Colleges

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	135,286
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	5,544
Likelihood of all-cause hospitalizations	2,758
MDE sample size requirement to detect 20% effect	
Total expenditures	1,386
Likelihood of all-cause hospitalizations	690
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician survey
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian.

We plan to carry out a rigorous impact analysis of the e-Referral and e-Consult intervention. As a first step in this analysis, we will construct a comparison group of patients from a matched set of physician practices associated with academic medical centers. To identify candidate practices for matching, we are currently working to secure information on the characteristics (specialty, number of providers, payer mix, and number of patients) of academic medical centers from IMS Health.

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V. NEXT STEPS

A. Implementation evaluation

As the Association of American Medical Colleges enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will continue to assess the validity of a comparison group drawn from patients who visited a primary care provider within networks that include AMCs. We will then select comparison AMCs by matching to participating AMCs on simple characteristics—such as, the presence of ACOs or other shared savings plan arrangements, size, utilization of electronic medical record software, patient volume, number of primary care physicians in the network, and geography. The list of potential comparison AMCs is derived from a 1997 list of integrated AMC hospitals and includes long-standing AMCs, such as those in the treatment group, with similar integrated hospital structures.[6] Other characteristics of the networks considered for inclusion in the comparison group will be obtained from IMS Health's large proprietary, 100 percent telephone-verified health care database, which can identify the association of a health care provider with a particular health system. The comparison beneficiary populations will ultimately be defined as all adult Medicare FFS patients seen by physicians at primary care practices of the chosen comparison AMCs.[7] In addition, we will compare the number of visits to and expenditures for the specialty departments of interest.

After attributing beneficiaries to the treatment and comparison groups, we will create the variables necessary for the analysis, including outcome and explanatory variables, and compare characteristics across those two groups to ensure sufficient comparability between the populations. We will assess the need to conduct a propensity score analysis to match comparison beneficiaries with those in the CORE AMCs and will estimate impacts. We will describe our findings in future reports.

[6] See https://www.aamc.org/download/372006/data/01-97_integrated_academic_medical_center_hospitals.pdf.

[7] It would be desirable, in principle, to contrast outcomes for beneficiaries who received eConsults or eReferrals with outcomes for a comparison group of beneficiaries treated by similar physicians who did not have access to these services. However, we have no means of identifying which treatment group beneficiaries received eConsults or eReferrals, nor can we identify in Medicare claims which beneficiaries in a comparison group received services generated by a standard consult or referral request.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering a survey of clinician staff affiliated with Association of American Medical Colleges. Eligible clinicians include physicians, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

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APPENDIX B.2.

THE AMERICAN COLLEGE OF CARDIOLOGY FOUNDATION

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MATHEMATICA
Policy Research

REPORT

APPENDIX B.2

HCIA Round Two Evaluation: The American College of Cardiology Foundation

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Smarter Management and Resource Use for Today's Complex Cardiac Care (SMARTCare) program from the American College of Cardiology Foundation, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the American College of Cardiology's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the American College of Cardiology made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the American College of Cardiology and its sites addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the American College of Cardiology's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following information:

- An overview of the SMARTCare program (Section II)

  Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)

- An update to, and any findings from, our analysis of Medicare claims (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The American College of Cardiology is implementing its SMARTCare program at nine clinical sites throughout Wisconsin and Florida. Key program characteristics are noted in Table 1. The program, which was launched on November 11, 2014,[2] and spans three years, relies on health information technology (health IT) to (1) provide clinical decision support for managing stable ischemic heart disease (SIHD) to cardiologists and other clinical specialists at the point of care, (2) support patient-clinician shared decision making, and (3) enable the use of clinical registries to track and improve care. The primary participants in the SMARTCare program are Medicare beneficiaries who receive care and are evaluated for SIHD at the nine clinical sites. Participants covered by private insurance are also eligible to participate. The American College of Cardiology hopes to serve 24,462 indirect program participants by the end of the third year of the cooperative agreement.[3] The clinical decision support provided with these tools is aimed at (1) reducing use of imaging tests and elective percutaneous coronary interventions (PCIs) that do not meet appropriate use criteria, (2) reducing the risk-adjusted bleeding complication rate for elective PCIs, (3) increasing adherence to coronary artery disease (CAD) treatment guidelines, and (4) improving outcomes measured with either the Seattle Angina Questionnaire score (patients with chest pain) or the Heart Quality of Life score (patients without chest pain). SMARTCare sites use five related tools to meet these aims:

1. **IndiGO** calculates and displays a personalized risk of an adverse event; it also suggests and prioritizes approaches with the greatest potential to reduce that risk.
2. **FOCUS** is a computerized decision-support tool that incorporates participant-specific information to determine whether ordered imaging meets appropriate use criteria and, if so, which test is most appropriate (and cost-effective) for a specific participant.
3. **ePRISM** and **eLumen** produce a customized, patient-specific consent form that provides participant education along with estimates of benefits and risks of complications, tailored to each participant prior to invasive cardiac catheterization or PCI. eLumen is an extension of ePRISM that takes patient information from ePRISM and provides guidance to the physician during catheterization to reduce complications.
4. **Tonic**, a web-based application that runs on an iPad, is used to document participant consent for collection of personal health data and to track participant-reported outcomes going into and coming out of treatment.
5. **Health Dialog** provides additional participant education materials—such as a pamphlet explaining stress chest discomfort—to inform and prepare participants for a more effective dialogue with their physicians.

[2] After a planning period, the awardee's program began to operate as of this date.

[3] Program participants are considered indirect participants if the services they receive are paid for with payment sources other than HCIA R2 funding.

Use of these tools is intended to guide clinician decisions—from ordering tests through performing procedures—in order to reduce inappropriate use of cardiac screening tests and procedures and to reduce rates of complications. The tools also provide customized, patient-specific estimates of risks and benefits of specific procedures, as well as educational materials to support shared decision making.

The American College of Cardiology has reported that all of the tools were operable at four sites, as of the seventh program quarter, and at least four of the tools were operable at an additional five sites. The most commonly implemented tools were FOCUS and Tonic, which were implemented across nine of the sites. The least commonly implemented tool was IndiGO, which was implemented across six of the sites. The SMARTCare initiative requires that these tools work with multiple electronic medical record (EMR) systems across a variety of organizational settings. For effective use, most clinical sites embed the tools within their EMR systems so that they are available at the point of care, when physicians make recommendations and participants make decisions.

The awardee continued work in developing a payment model that is capable of supporting use of the tools beyond the end of the funding period, but does not anticipate implementing the payment model before the end of the award period. They plan to complete an implementation plan regarding moving forward with the payment model.

A. Summary of findings from the first annual report

The program narrative in our first annual report noted that the American College of Cardiology's main achievement during the first year of its cooperative agreement was that program leaders and vendors provided on-site training and substantial implementation support to sites before the program was launched.

We also identified some initial challenges in implementing the program and the American College of Cardiology's strategies for addressing them.

- Educational materials were not helping patients make decisions about their treatment. The requirement that they return the patient education booklet and DVD to the sites was leading some patients to refuse them. These materials were available only in English and required patients to have a DVD player. To address these concerns, sites considered whether to (1) give patients prepaid, self-addressed envelopes and (2) ask the awardee to translate the materials into Spanish.
- The extent to which sites were able to integrate the SMARTCare tools into their EMR systems varied depending on the functionality of each site's EMR system. To address this, sites had to work with their EMR vendors to determine the best way to incorporate the tools while not adversely affecting workflows.

Finally, we identified several early lessons learned by the American College of Cardiology in implementing its program.

- SMARTCare implementation is a complex task that requires technical support and a great deal of staff involvement.

- Visible support from local leaders was an important component of implementation success.
- Flexible start-up periods allowed sites to launch as soon as they met the requirements for implementation.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the American College of Cardiology made progress in the following areas:

- The American College of Cardiology continued to focus on boosting enrollment and has enrolled a little more than half of its target of 25,557 beneficiaries. Physician champions continued to foster the active participation of clinicians and patients.
- The awardee continued work in developing a payment model that is capable of supporting use of the tools beyond the end of the funding period, but continued to face significant barriers with obtaining cost information.
- The awardee added new ways of communicating with implementing sites and encouraging cross-site collaboration. For example, site staff can use collaborative software called Basecamp to engage in discussions across sites about implementation successes and barriers. Town-hall meetings for site leaders and other staff also are held to discuss program progress.

Below we note the key challenge that the awardee has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Developing an effective payment model to support use of the SMARTCare tools beyond the end of the funding period

As the American College of Cardiology enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The sites continue to face challenges in incorporating SMARTCare tools into their clinical workflows.
- Some physicians expressed concern that the tools do not support their decision making.
- The American College of Cardiology had made limited progress on developing a payment model due to the competing demands of refining the service model.

Table 1. American College of Cardiology: SMARTCare program characteristics at a glance

Program characteristic	Description
Purpose	The American College of Cardiology Foundation (ACCF) is focusing on changing clinician behavior by providing the following: • Decision-support tools at the point of care to assess treatment options for SIHD • Participant education materials on specific treatment options • Individually tailored risk and benefit information to support shared decision making
Components	• Clinical decision support • Shared decision making • Health IT
Target population	The primary participants are Medicare beneficiaries who receive care at the awardee sites and who are being evaluated for SIHD. Participants covered by private insurance are also eligible for the program.
Theory of change/theory of action	Improving risk communication and shared decision making between participants and cardiac physicians will lead to optimizing medication and lifestyle programs for the greatest potential impact on a participant's risk factors.
Payment model	Value-based payments, shared savings, bundled or episode payment, partial or full capitation for medical services
Award amount	$15,830,092
Launch date[a]	11/11/2014
Setting	Provider-based settings: primary care physician, specialty care clinic, hospital, academic setting
Market area	Rural, urban, suburban
Market location	Florida, WI
Core outcomes	• Decrease in the percentage of imaging tests that do not meet appropriate use criteria • Decrease in the percentage of elective PCIs that do not meet appropriate use criteria • Decrease in the risk-adjusted bleeding complication rate for elective PCIs • Improvement in either the Seattle Angina Questionnaire score (patients with chest pain) or the Heart Quality of Life score (patients without chest pain) • Increase in adherence to CAD treatment guidelines: - Angiotensin converting enzyme (ACE) inhibitor or angiotensin receptor blockers (ARB) therapy prescribed for participants with diabetes or left ventricular systolic dysfunction (LVSD) - Oral antiplatelet therapy prescribed for participants with CAD - Aspirin or other antithrombotic prescribed for participants with acute myocardial infarction (AMI), coronary artery bypass graft (CABG), PCI, or LVSD - Lipid control prescribed for participants with CAD - Beta-blocker therapy prescribed for participants with CAD - Tobacco use assessment and tobacco cessation counseling administered to participants

[a]After a planning period, the awardee's program began to operate as of this date.

CAD = coronary artery disease; IT = information technology; LVSD = left ventricular systolic dysfunction; PCI = percutaneous coronary intervention; SIHD = stable ischemic heart disease

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the American College of Cardiology in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June through July 2016. For the analyses of the American College of Cardiology's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- American College of Cardiology program leaders
- Site-level program staff and frontline users of the SMARTCare tools from two clinical sites in Florida and one clinical site in Wisconsin

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the American College of Cardiology's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Participants are patients whose physicians are using the SMARTCare tools. Once a physician agrees to use a SMARTCare tool, the physician must receive consent from each patient on his panel for the patients to be enrolled in the program. For this reason, our discussion focuses on how outreach to physicians has affected the number of enrolled participants.

Overall, the American College of Cardiology reported to the implementation and monitoring contractor that it indirectly served 14,018 participants from November 2014 (the launch of its program) through August 2016, which represents about 55 percent of its 25,557 projected indirect participants (Figure 1). The baseline characteristics of participants whom we could identify in Medicare fee-for-service (FFS) enrollment and claims data are presented in Section IV. Interview respondents attributed this lower-than-expected enrollment primarily to a lack of physician buy-in and to the complex consent forms. Physician champions were identified as being important to fostering enrollment, as they were able to encourage other physicians to use the tools to aid decision-making processes.

In some clinical sites, lack of sufficient physician buy-in for using the tools remains a barrier for participation and continues to affect progress towards meeting the three-year enrollment goal. One site lead reported that some clinicians see using the tools as an extra step that disrupts the workflow and has a negative impact on productivity—which may potentially dissuade other clinicians from participating. A physician champion reported that some clinicians see the tools as a barrier to their decision-making process and believe that their own clinical judgement is superior to the guidance provided by the tools. Two sites where we conducted interviews are planning more training opportunities for physicians to learn how to use the tools and to address these and other barriers to use.

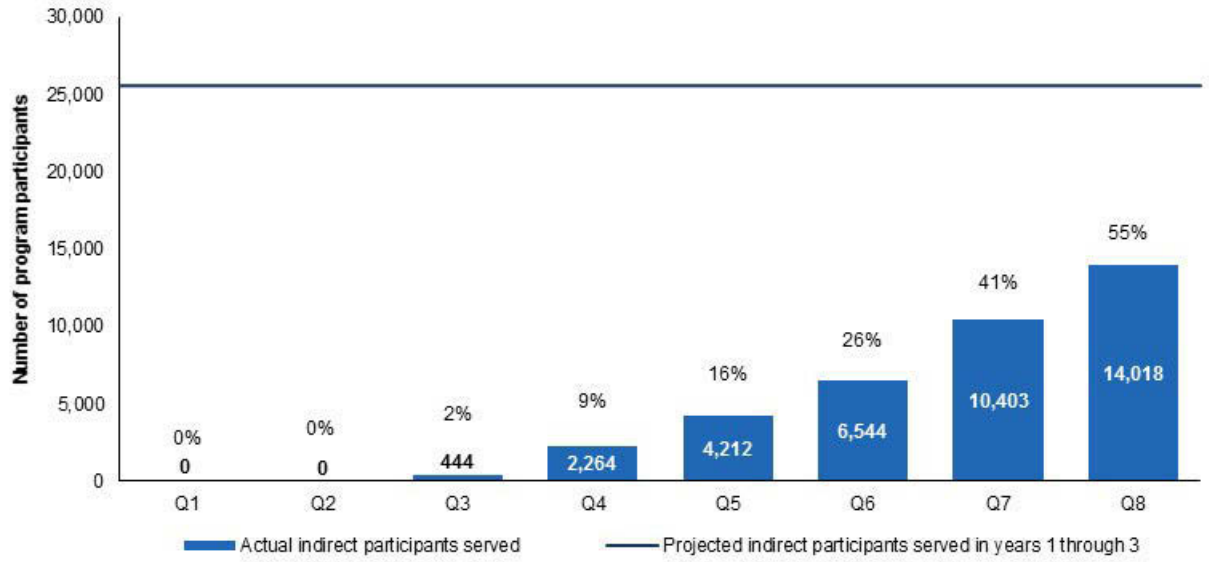
Physician champions continue to encourage staff members to use the tools. They work with IT staff to navigate the sometimes-complex integration of the tools with local EMR systems and engage staff to increase patient enrollment. One site has designated a "managing member" whose role is to recruit physicians to use the SMARTCare tools for their patients. This managing member is a physician and can therefore discuss the benefits of the tools with other physicians as a peer. An IT support staff member at one site reported that there was potential for greater uptake in the future because some physicians believe the SMARTCare tools will aid their decision-making processes, but the physicians have not yet begun using the tools.

> "[The physician champion] is a good person to have on board. . . . He is able to have that physician [to] physician interaction and . . . talk about the benefits of the tool and what it does for patient care and quality of care."
>
> *— IT support staff member*

The logistics of managing the collection and documentation of patient consent continues to be a barrier to enrollment for patients and to participation for clinicians. The consent forms are seen as burdensome for some sites because clinicians are required to document patient consent by using their own form and a SMARTCare form, thus duplicating the time and effort required to enroll patients. To address this issue and to increase patient enrollment, the American College of Cardiology initiated a "Rock the Consent" campaign during the seventh quarter. The "Rock the Consent" action team created communications materials such as pamphlets to provide

guidance to clinicians on obtaining consent from patients. One of the clinical sites where we interviewed staff is creating a pamphlet for patients describing SMARTCare and the benefits to participation as an adjunct to the program-wide initiative. The locally produced pamphlet is targeted at patients who are reluctant to participate due to concerns about the release of their health information. The pamphlet will be provided to patients in conjunction with the consent form.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, first through eighth program quarters (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. ACCF does not have direct program participants.

B. Implementation of the service delivery model

The American College of Cardiology continues to face barriers in integrating the SMARTCare tools into sites' workflows. The use of a new platform, Basecamp, has helped to engage stakeholders and address local implementation barriers. The potential alignment of the SMARTCare program with requirements for participating in future alternative payment systems is an important motivator for implementation in some of the sites.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.

- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Some sites reported difficulty incorporating SMARTCare tools into regular clinical workflows and effectively integrating the tools with existing EMR systems and data sources. In addition, some physicians were concerned that the tools did not effectively support their decision making. Receptivity to the use of the SMARTCare tools continues to vary across sites and across potential users within the sites. In one site, implementation of the tools required the development of redundant work processes, in which information was entered into the tools off-line, then entered separately into the EMR system for documentation, and then entered into a third system to receive payer authorization for a specific test. This reportedly limited the usefulness of the tools for supporting clinical decision making. In some cases, physicians saw the program as a temporary research project, rather than as a change to clinical care processes likely to persist beyond the end of the program.

> "[Use of the tools] is time-consuming. It doesn't impact your decision-making tree, and . . . it is redundant to the other steps that are already in place by third party payers to deal with ordering of diagnostic testing."
>
> *— Physician champion*

2. Implementation processes

The awardee has continued to engage implementing sites by using multiple communication approaches and providing regular data feedback. The use of the Basecamp software facilitates communication with the participating sites and provides a forum for stakeholders to discuss implementation issues as they arise. Site-level acceptance of this approach varies, with some seeing this as an efficient way to disseminate key program information and others seeing it as providing a forum for unhelpful conversations. The awardee regularly provides each site with data to compare its performance with other participating sites. The American College of Cardiology also recently engaged a contractor to help sites use these data for quality improvement.

3. Organizational and external context

The potential for the SMARTCare program to meet future Merit-Based Incentive Payment System (MIPS) and Alternative Payment Model (APM) requirements is a key driver of implementation. In two of the sites where we conducted interviews, leaders reported that they saw the SMARTCare program as part of their efforts to meet the coming demands of value-based payment programs. In these sites, the tools were seen as particularly useful for monitoring and supporting quality improvement efforts. In addition, the anticipated funding associated with the MIPS and the APM was seen as providing important support for continued use of the

SMARTCare tools. However, the awardee lead reported that in some sites physicians remain resistant to using the tools because they do not think the data are sufficiently reliable to drive quality improvement efforts.

C. Development of the payment model

As of July 2016, the American College of Cardiology had made limited progress on developing a payment model due to the competing demands of implementing and refining the service model. Before the start of the SMARTCare program, the American College of Cardiology developed a model bundled payment for SIHD in collaboration with members of the business community and insurers in Wisconsin, and is working to finalize this model. The awardee continues to work with outside partners, including the Partnership for Women and Families and the Center for Healthcare Change, to gather information and suggestions for the refinement of the proposed bundled payment for SIHD. In addition, the awardee reportedly has begun engaging payers and obtaining patient data to develop and refine potential payment models for the SMARTCare program. As part of this process, the American College of Cardiology reports engaging site-level stakeholders, including physicians and system-level staff, to determine the specific needs of each site, current market characteristics, and requirements for building a sustainable payment model. Nonetheless, the awardee continues to face challenges in calculating cost at baseline and cost per episode of delivering care due to incomplete or inaccessible site-level data. Recently, the awardee completed a Research Data Assistance Center (ResDAC) application to gain access to these data. In addition, the awardee is seeking assistance with interpreting costs. The American College of Cardiology is working to identify alternatives to Medicare claims data that can generate insight into the impact of both the payment and delivery models. The delays associated with collecting and interpreting cost information as well as the competing demands of implementing and improving access to the SMARTCare tools have led to delays in submitting a payment model. The awardee reports that they do not anticipate actual implementation of the payment model before the close of the award period; however the awardee plans to finalize the payment model implementation plan.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

Baseline data for the American College of Cardiology's SMARTCare program reflect a diversity of care settings but general uniformity in patient mix. This finding stems from the fact that the American College of Cardiology implemented the SMARTCare program in nine organizations in Wisconsin and Florida, including an academic medical center as well as not-for-profit integrated health systems, hospital-owned outpatient clinics, and for-profit private practices. The group of participants represents both urban and rural settings. However, the program specifically targets patients with SIHD who have indications for functional stress testing. Patients are enrolled in the program when their clinician completes, for their case, the FOCUS decision-support tool, which helps to guide the appropriate ordering of cardiovascular imaging and tests.

We present data from all nine SMARTCare program sites. Many of the identified patients are private pay or are enrolled in Medicare Advantage. This report includes only the minority of SMARTCare participants who are Medicare fee-for-service (FFS) beneficiaries who consented to the use of their data.

A. Baseline characteristics of the treatment group

For the purposes of presenting baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all program criteria for a period of 90 days within the 12-month period immediately prior to the start of their eligibility to receive program services. In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, to ensure a sufficient run-out period to capture nearly all claims for the most recent enrollees. The calendar period covered by the baseline quarters is based on the enrollment date for each enrollee and therefore varies by enrollee. After we excluded patients who did not meet the above criteria, a total of 918 participants were included in the analysis of baseline characteristics for this report.

The Medicare FFS beneficiaries participating in the SMARTCare program in its first year of operation are mostly elderly, although few are among the oldest beneficiaries. Ten percent are under age 65, and 8 percent are over age 85. Slightly more than half (56 percent) are male, higher than the percentages of all Medicare beneficiaries in the two states (which range from 43 percent to 44 percent). By race, 85 percent are identified as white, 8 percent are black, and 6 percent are Hispanic or other. Twelve percent are dual eligibles, about the same as Medicare beneficiaries overall in these two states (Table 2). At 1.1, the median hierarchical condition categories (HCC) score was only slightly above the national average.

Participants in this initial group at baseline had somewhat higher monthly Medicare expenditures in the quarter prior to enrollment ($1,119) than in the year prior to enrollment ($986), perhaps reflecting recent conditions that precipitated cardiac diagnostic services. Both amounts were substantially higher than the average for the general Medicare population of

$792 in 2014.[5] About one-quarter (23 percent) of the participants had a hospital admission in the year preceding enrollment. The participants averaged 7 primary care visits and 14 specialist visits in the preceding year (Table 3).

As the goal of the program is to reduce the percentage of imaging procedures not meeting the current appropriate use criteria, we report selected awardee-specific measures related to diagnosis and testing for cardiovascular conditions. The observed patterns in baseline claims reflect cardiovascular conditions expected in the target population. In the preceding year, 46 percent of participants had a diagnosis of chest pain, 95 percent had a cardiovascular diagnostic test, 81 percent had an electrocardiogram, and 49 percent had cardiovascular diagnostic imaging (Table 4).

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 918)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	96	10
65 to 74	463	50
75 to 84	290	32
85 and older	69	8
Gender		
Female	402	44
Male	516	56
Race		
White	783	85
Black	76	8
American Indian, Alaska Native, Asian/Pacific Island American, or other	31	3
Hispanic	12	1
Original reason for Medicare eligibility		
Old age and survivor's insurance	714	78
Disability insurance benefits	180	20
End-stage renal disease (ESRD)[a]	24	3

[5] For national average rates, see the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html.

Table 2 *(continued)*

Characteristics	All participants (N = 918)	
	Number	Percentage
Hospice[b]		
Medicare/Medicaid dual status, percentage dual[b]	114	12
HCC score[c]		Statistic
Mean		1.48
25th percentile		0.72
Median		1.12
75th percentile		1.85

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which participating organizations report completing the FOCUS assessment tool for a beneficiary. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	918	870	890	918	918
Average Medicare expenditures PBPM[a]					
Total	986 (50)	894 (75)	938 (101)	980 (79)	1,119 (82)
Acute inpatient	292 (28)	269 (44)	259 (85)	311 (53)	324 (49)
Inpatient other[b]	22 (7)	27 (16)	18 (11)	20 (15)	23 (12)
Outpatient[c]	237 (17)	236 (26)	241 (22)	203 (18)	269 (22)
Physician services	353 (15)	303 (25)	344 (21)	363 (22)	394 (17)
Home health	34 (5)	26 (6)	34 (8)	30 (7)	45 (10)
Skilled nursing facility	23 (6)	9 (5)	15 (7)	26 (12)	39 (16)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	25 (2)	24 (3)	26 (3)	27 (3)	26 (3)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	372 (29)	334 (45)	346 (55)	368 (47)	418 (50)
Outpatient ED visits	511 (37)	454 (63)	491 (55)	443 (51)	649 (65)
Observation stays	95 (12)	70 (19)	105 (21)	75 (24)	131 (24)
Primary care visits in any setting	6,625 (212)	5,929 (279)	6,091 (294)	6,206 (493)	8,179 (338)
Primary care visits in ambulatory settings	5,486 (154)	4,979 (190)	5,086 (214)	5,201 (460)	6,601 (217)
Specialist visits in any setting	13,741 (440)	12,178 (611)	13,074 (558)	12,878 (958)	16,662 (577)
Specialist visits in ambulatory settings	11,904 (349)	10,449 (456)	11,523 (425)	11,092 (896)	14,401 (423)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	23 (1)	7 (1)	7 (1)	8 (1)	9 (1)
Percentage with an outpatient ED visit[e]	32 (2)	9 (1)	10 (1)	9 (1)	13 (1)
Percentage with an observation stay[f]	8 (1)	2 (<0.5)	3 (1)	2 (<0.5)	3 (1)
Percentage with a 30-day readmission among all discharges	12 (2)	6 (3)	10 (4)	12 (4)	17 (4)
Percentage of participants with a readmission among all participants	3 (1)	0 (0)	1 (<0.5)	1 (<0.5)	1 (<0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

Table 4. Prevalence of chest pain diagnosis and prior service use among treatment group beneficiaries at baseline (N = 918)

Condition or service	Percentage
Chest pain diagnosis	46
Evaluation and management visit	72
Cardio diagnostic lab test	95
Electrocardiogram (ECG)	73
Diagnostic imaging	49
Noninvasive test	4
ECG monitoring	13

Source: Mathematica's analysis of information from the awardee's finder file and from Medicare claims and enrollment data as of May 31, 2016.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: American College of Cardiology Foundation

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	1,508
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,716
Likelihood of all-cause hospitalizations	2,454
MDE sample size requirement to detect 20% effect	
Total expenditures	429
Likelihood of all-cause hospitalizations	614
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable. Expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician and staff surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We will conduct a rigorous impact analysis of the SMARTCare intervention. Because the intervention is implemented by physician practices in Florida and Wisconsin, we plan to match participating physician practices to other practices in those two states that are similar in terms of provider specialty, payer mix, and patient volume. From these practices, we will identify and select patients with SIHD to form the comparison group.

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V. NEXT STEPS

A. Implementation evaluation

As the American College of Cardiology enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During these interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We are working to obtain from IMS Health data on SMARTCare practices and potential comparison practices in Florida as well as states adjacent to Wisconsin. We will look for comparison practices with similar practice ownership, size, physician specialty mix, and patient characteristics. After we select the matched comparison group of providers, we will identify patients of those providers who are evaluated for potential or known SIHD.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, cardiologists, registered nurses, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

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APPENDIX B.3.

ALTARUM INSTITUTE

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MATHEMATICA Policy Research

REPORT

APPENDIX B.3

HCIA Round Two Evaluation: Altarum Institute

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Altarum Institute's Michigan Caries Prevention Program (MCPP), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Altarum's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Altarum made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Altarum and its implementation partners addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its implementation partners to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Altarum's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following information:

- An overview of the MCPP (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Altarum, a nonprofit health research organization, partnered with Delta Dental, the University of Michigan (UM) School of Dentistry, and the Michigan Department of Health and Human Services (DHHS), to use funding from HCIA R2 to implement the MCPP. The MCPP is a multifaceted program to improve access to and delivery of preventive oral health care for young Medicaid and CHIP beneficiaries in Michigan. Launched on May 8, 2015, the MCPP aims to (1) expand delivery of preventive oral health services by primary care providers who serve children, (2) build capacity in the dental safety net, and (3) integrate oral health care across primary care and dental settings. The MCPP is trying to displace the status quo in two key ways: (1) by training medical providers to refer patients, regardless of risk status, to dental homes and (2) by providing health information technology (health IT) to facilitate communication between medical and dental providers. Table 1 presents an overview of the MCPP.

The MCPP includes three primary components:

1. Education and training

- **Training and technical assistance (TA) for primary care providers serving children and their office staff.** This training covers (1) evidence-based standards of preventive oral health care (using the Smiles for Life[2] curriculum), (2) oral health screening, (3) referrals to dentists and establishment of a dental home, (4) the application of fluoride varnish, (5) patient and family education on oral health care, (6) processes for obtaining Medicaid reimbursement for covered services, and (7) guidance on how to adapt the intervention to the provider site. Participating providers are eligible to earn continuing medical education (CME) and maintenance of certification (MOC) Part IV credits. After Altarum finalizes development and deployment of a health IT system tailored for the program, this component will include training on the health IT system as well. Altarum provides ongoing TA for up to seven months after the initial training for sites enrolled in the CME and MOC performance and quality-improvement activity and for up to four months for other sites.
- **Educational outreach to dentists about evidence-based practices.** For example, parents and care providers should establish a dental home for every child by 12 months of age. Altarum and its partners intend to conduct outreach to dentists to educate them on evidence-based practices and to engage them in treating children with a high risk for dental disease.
- **Educational outreach to public health practitioners and dental hygienists in public health settings.** Altarum and its partners have begun to train public health practitioners on referring children to dentists and on educating parents about oral health care, with additional funding from the Delta Dental Foundation. Altarum and its partners also conduct outreach to

[2] Smiles for Life is a national oral health curriculum. Since 2008, Michigan Medicaid has reimbursed pediatric primary care providers (including physicians and nurse-practitioners) who receive training and certification for conducting oral health screening and applying fluoride varnish for children up to 35 months of age. In July 2012, the state required Smiles for Life certification for reimbursement for these services. The Smiles for Life editor gave permission to Altarum to use the curriculum and to directly certify physicians and nurse practitioners who complete the MCPP training in Smiles for Life.

dental hygienists, who can provide dental services in nonprofit settings without dental supervision under Michigan's PA 161 program.

2. Health IT system

- Referred to as the Michigan Dental Registry (MiDR), the health IT system includes a web-based and an electronic medical record (EMR) interface to facilitate documentation of preventive oral health service provision and referrals to dental providers as well as coordination between primary care and dental providers. The EMR module, which is still under development, also provides decision support for oral health risks. Altarum also intends for the MiDR to serve as a quality-monitoring tool for Michigan DHHS.[3]

3. Patient and family engagement

- Altarum and its partners conduct outreach and educational efforts that target children and their caregivers in schools; early childhood education programs; and public health settings, such as Women, Infants, and Children (WIC) sites.
- Altarum and its partners created a crowdsourcing website called SmileConnect that connects users such as community organizations and early childhood educators, who post oral health needs (for example, for educational materials or for oral health screenings), with users such as dental providers, who can fulfill those needs.
- Altarum and its partners are using broad-based dissemination strategies—including, an MCPP website and social media—to build awareness of the importance of oral health care among children and to create demand for oral health care.

The target population for the MCPP includes roughly 1 million Medicaid and CHIP beneficiaries in Michigan who are 17 years old or younger. However, the majority of program activities focus on beneficiaries who are most likely to benefit from the program—that is, children up to 5 years of age. Altarum decided to focus on the youngest children after it applied for HCIA R2 because the awardee believed that there was a greater opportunity to prevent the formation of caries among younger children. The program does not directly enroll patients, but rather trains primary care providers who treat the target population. Altarum aims to train 1,500 primary care providers by the end of the cooperative agreement. When providers sign up for training, they estimate the number of patients at their site who are 3 years old and younger and who are 17 years old and younger. These figures become the basis for estimating the number of indirect program participants.

Altarum and its partners expect the MCPP to (1) increase the proportion of low-income children who receive preventive dental services by 60 percent, (2) reduce the incidence of dental caries among low-income children by 30 percent, and (3) provide a net savings of $21.1 million to CMS.[4]

[3] The EMR module was completed in the third MCPP program year.

[4] Altarum lowered this goal from the $29.3 million stated in its initial application after CMS requested that the awardee remove the payment model implementation savings, which would have required a Medicaid demonstration waiver.

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified several successes achieved by Altarum during the first year of its cooperative agreement.

- Altarum successfully launched its training and TA program for primary care providers.
- Altarum added program staff to fill a number of positions, including training and TA program staff who provide TA to providers locally throughout Michigan.
- The awardee team engaged a number of oral health stakeholders at the state and local levels to collaborate on outreach activities and maximize efficiency of the MCPP operations.
- Altarum partnered with UM's health system and medical school to develop and launch a CME/MOC program as an incentive for provider participation in training and TA.

We also identified several challenges in implementing the program and Altarum's strategies for addressing them.

- Altarum faced challenges in initially establishing an effective partnership with the Michigan DHHS because of organizational changes that affected the department prior to the commencement of the cooperative agreement. These challenges delayed the development of the health IT system and payment model. To address these challenges, Altarum engaged a variety of stakeholders within DHHS to build support for state involvement in the MCPP.
- Altarum launched the training and TA component of the MCPP, of which the health IT tool was a planned element for future trainings. Without an operational health IT tool or vehicle for electronic communication between medical and dental providers, primary care providers trained by Altarum operationalized referrals to dental homes in ways that fit local needs, which may have implications for the effectiveness of this aspect of the MCPP. To address concerns about implementation among trained providers, the Altarum staff met regularly to review monitoring data and identify opportunities to improve the training or provide site-specific, targeted, follow-up support.

Finally, we identified several lessons learned by Altarum in implementing its program.

- After initially casting a wide net to recruit primary care providers for training and TA, Altarum realized that some of the practices signing up for training were not located in areas with high concentrations of Medicaid beneficiaries. To meet its goal of affecting over 1 million Medicaid beneficiaries, Altarum slowed recruitment and shifted to targeted strategies focused on providers who served low-income populations.
- Altarum and its partners are developing a health IT system that the state can use for oral health care monitoring, which requires transfer to the state for sustainability. However, the value of the system was not immediately clear to Michigan DHHS stakeholders. To address this issue, Altarum sought to (1) develop a tool that aligned with the state's IT infrastructure and (2) maintain the commitment of appropriate state leaders.
- The MCPP is attempting to address a large-scale public health problem by using both delivery system interventions and broader public health strategies. As such, the MCPP has

evolved to add new components, such as school engagement, to address gaps in oral health care. However, program leaders observed that managing the project's scope while remaining focused on core program outcomes will be a critical issue as the MCPP moves forward.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Altarum made several changes to the MCPP.

- After discussion with CMS and the HCIA R2 payment model TA team, Altarum decided to delay the development of its payment model to focus on building an evidence base to support (1) enhanced dental reimbursement to dental providers through Michigan's Medicaid dental benefits program, (2) payment to medical providers for oral health care services, and (3) TA for medical providers who are implementing oral health care services. Altarum has not revised its planned model but is prioritizing data analysis over engaging payers to implement the model.
- Altarum sought and obtained approval for the MiDR, its health IT tool, to become a Meaningful Use (MU) specialized registry for the purposes of CMS's Electronic Health Record Incentive Program, an external program that Altarum is hoping to leverage to engage primary care providers and dentists in the MCPP.
- Altarum continued to focus on recruiting providers in high-need areas to boost the number of Medicaid pediatric patients (indirect program participants) served. As one strategy, Altarum developed and piloted webinar-based training to primary care providers in Michigan's Upper Peninsula (UP) and other rural areas. The awardee also started to recruit large health systems, with the goal of enlisting multiple practice sites and further increasing the number of indirect participants reached.
- Altarum made adjustments to the training and TA program for primary care providers, based on monitoring data. For example, Altarum prioritized working with sites on billing (even before training) and adapted the training to explicitly address a common fear among medical providers—that is, that they would be bitten in the process of applying fluoride varnish.

Below we note the key challenges that Altarum has worked to address in the second year of its cooperative agreement, including factors that have influenced the awardee's ability to address these challenges.

- Although Altarum and Michigan DHHS report a positive working relationship, particularly in supporting the training and TA component of the program, the awardee team continued to experience challenges coordinating efforts on the development of the health IT system. The availability of HCIA R2 funding facilitated the state's involvement in developing the health IT system, which raises concerns about the state's long-term interest and ability to invest in the system without additional funding sources. To address this challenge, the awardee team is exploring alternative sources of funding beyond the cooperative agreement.
- Altarum launched SmileConnect in February as planned, but experienced lower-than-expected engagement among early childhood providers. Altarum implemented targeted strategies to increase engagement—for example, by presenting at a Head Start program in

Flint, Michigan, a target geographic area for the MCPP—and developed an outreach plan. By the seventh program quarter, Altarum had reported increased engagement in the site through an increased number of registered users.

- Altarum met roughly two-thirds of its three-year enrollment target for primary care providers. However, the number of indirect program participants (Medicaid pediatric patients) reached by the program lagged behind Altarum's three-year projection, suggesting that the awardee may not reach as many indirect participants as planned by the end of the cooperative agreement.

As Altarum enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- In its current form, Altarum plays a hands-on administrative role in SmileConnect—for example, by facilitating the interactions between requesters and donors—which raises questions about its scalability. Altarum plans to reduce its administrative role in SmileConnect over time, after more of the site processes are automated and more donors sign up with the site.
- Altarum has faced persistent challenges in trying to obtain Michigan Medicaid data, which are needed to develop the evidence base for the payment model. For example, Altarum would like to publish manuscripts that highlight findings about the value of Healthy Kids Dental, Michigan Medicaid's enhanced dental program for oral health services; medical reimbursement for oral health services; and the MCPP TA program. As a work-around for the time being, Altarum is using Medicaid MAX data. However, Altarum anticipates that Michigan will provide the requested Medicaid data in early 2017.

Table 1. Altarum: MCPP characteristics at a glance

Program characteristic	Description
Purpose	The Altarum Institute, a nonprofit health research organization, has partnered with Delta Dental, the UM School of Dentistry, and the MI DHHS to implement the MCPP, a multifaceted program to improve preventive dental care for young Medicaid and CHIP beneficiaries in the state.
Components	• Education and TA. The MCPP provides training and TA to primary care providers serving children and their office staff that covers (1) evidence-based standards of oral health care, (2) oral health screening, (3) referrals to dentists and establishment of a dental home, (4) the application of fluoride varnish, (5) patient and family education on oral health care, (6) processes for obtaining Medicaid reimbursement for covered services, and (7) guidance on how to adapt the intervention to the provider site. The MCPP also includes educational outreach to dentists, public health professionals, and dental hygienists on evidence-based standards for preventive oral health care. • Health IT. The MCPP includes a health IT system (the MiDR) that will (1) assist the primary care provider in documenting preventive service provision, (2) serve as a clinical decision-support tool to calculate and track patient risk, and (3) facilitate referrals to an accepting dental provider. • Patient and family engagement. Altarum is using broad-based dissemination strategies to inform parents, children, and other stakeholders about the MCPP and evidence-based guidelines for oral health care, through schools and early childhood organizations; public health settings (for example, WIC clinics); an MCPP website; and social media.
Target population	Just over 1 million Medicaid and CHIP beneficiaries in MI who are 17 years old or younger
Theory of change/theory of action	Altarum hypothesizes that if more children, particularly younger children and those at high risk of dental disease, received preventive oral health care, it would reduce the following: dental disease in the target population, the number of Medicaid beneficiaries with dental caries, and the costs associated with untreated dental caries. Altarum also hypothesizes that the program will improve beneficiaries' access to dental care by providing care in public health settings and by increasing referrals from primary care providers to dentists.
Payment model	New fee-for-service (FFS) payment, value-based payments
Award amount	$9,383,762
Launch date[a]	May 8, 2015
Setting	• Education and training. Pediatric provider clinics and medical centers, dental offices, and other public health settings • Health IT. To be accessed in primary care and dental clinics; hosted by Altarum or MI DHHS • Patient and family engagement. Schools, early childhood education programs, public health settings, SmileConnect website, MCPP website, and social media throughout MI
Market area	Primarily urban and rural, in areas with high proportions of low-income and Medicaid beneficiaries
Market location	MI
Core outcomes	• Increase the proportion of low-income children who receive preventive oral health care by 60 percent • Reduce the proportion of Medicaid beneficiaries who have dental caries by 30 percent • Provide a net savings to CMS of $21.1 million

[a]MCPP became operational as of this date.

CHIP = Children's Health Insurance Program; DHHS = Department of Health and Human Services; IT = information technology; MCPP = Michigan Caries Prevention Program; MiDR = Michigan Dental Registry; TA = technical assistance; UM = University of Michigan; WIC = Women, Infants, and Children.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Altarum in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone and in-person interviews with program staff from June 21 through June 30, 2016. For the analyses of Altarum's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct interviews with the following program staff:

- Program leaders at Altarum and its partners
- Trained primary care providers who are implementing the MCPP

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[5] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Altarum's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

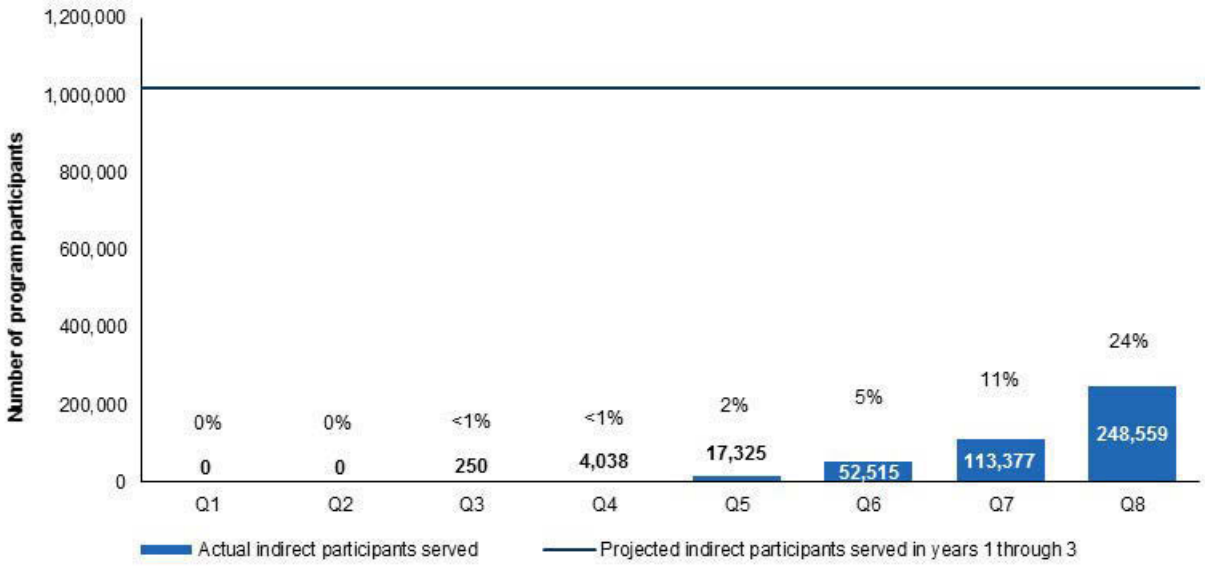
A. Program enrollment

Altarum trained 1,012 primary care providers from May 2015 through August 2016, which represents about 67 percent of its three-year enrollment target of 1,500 primary care providers. Overall, Altarum reported to the implementation and monitoring contractor that it indirectly served 248,559 participants from May 2015 (the launch of its program) through August 2016,

[5] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

which represents about 24 percent of its 1,018,744 projected indirect participants (Figure 1). Although the awardee is on pace with its three-year enrollment target for primary care providers, the providers trained by Altarum serve fewer Medicaid pediatric patients (indirect participants) than Altarum had anticipated. To increase the program's reach among the target patient population, Altarum employed a variety of strategies to recruit primary care providers who serve large numbers of Medicaid beneficiaries and to overcome barriers to their enrollment in the MCPP.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. Altarum does not have direct participants.

Altarum and its partners experienced several barriers to enrolling target primary care providers, particularly those who serve large numbers of Medicaid pediatric patients, such as federally qualified health centers (FQHCs). Barriers included a cumbersome enrollment process, competing demands on the provider side, and limited staff resources to fully cover the Upper Peninsula of Michigan, where several high-need providers reside. To address barriers to enrollment, Altarum streamlined the enrollment paperwork and collected testimonies from participating practices about the ease of implementing the MCPP oral health interventions to mitigate provider concerns about the additional burden. Further, Altarum continued to target certain providers who were likely to serve low-income, high-need patient populations, such as FQHCs and rural health clinics, but also began engaging large health systems with residency programs. In doing so, Altarum sought to gain access to larger numbers of providers and multiple practice sites and to reach residents early in their careers. However, Altarum noted that

not all of the practices were willing to engage; moreover, some systems still preferred Altarum to engage their practices on an individual basis. To train providers from multiple practices at once, Altarum used a "grand rounds" approach as an alternative to site-specific training. However, Altarum staff noted that the MCPP implementation appeared to be more effective in sites that received site-specific training rather than grand rounds training. They plan to rely primarily on site-specific training going forward. Thus, it was unclear whether the approach to engaging health systems would result in any efficiency in terms of training and TA.

Altarum also continued to expand its program reach within the state, first moving into western Michigan and then pushing into northern Michigan. The team faced challenges extending staff into the Upper Peninsula, based on limited staff time and ability to travel there. Altarum decided to pilot a remote training via live streaming as well as remote, phone-based TA for Upper Peninsula providers. Remote training and TA seemed to be a viable option because Altarum program staff had prior experience conducting such training and because providers in the Upper Peninsula are accustomed to receiving training and supports remotely, according to program staff. Altarum obtained approval from the UM Health System and Medical School, which oversees the CME/MOC program, to allow for this mode of training and TA. After piloting this approach in October 2016, Altarum and UM will determine whether this can be a way to offer training and TA to other providers in the Upper Peninsula and other rural areas.

> "[W]e saw at a pilot site . . . that medical residents were more likely to apply fluoride varnish than the preceptors. . . . The more we establish this as a normal behavior for the medical residents, they're more likely to pick up on it, and then they will be practicing medicine for 40 more years."
>
> *— Program leader*

Despite the barriers to recruiting primary care providers, Altarum made considerable progress toward its three-year enrollment target for these providers in Year 2. Altarum and its partners identified three primary facilitators to recruitment of primary care providers and engagement of dentists: (1) utilizing the connections of the leadership team and advisory committee, (2) leveraging provider participation in CMS's Electronic Health Record (EHR) Incentive Program, and (3) providing CME/MOC credits.

The awardee team includes individuals who are well connected throughout Michigan's oral health community and primary care provider networks and who are willing to leverage these connections to recruit primary care providers and promote the MCPP. The Physician Advisory Committee (PAC) played a key role in helping Altarum expand into the western part of Michigan. The PAC also provided testimonials that Altarum incorporated into outreach materials to promote the MCPP. In addition, UM's dentistry school provided connections to residency programs. Altarum also leveraged provider participation in CMS's EHR program by seeking and obtaining approval for the MiDR to become an MU specialized registry for both medical and dental providers for the 2016 reporting year. As of the sixth program quarter, Altarum had reported that over 1,500 providers, including medical and dental providers, indicated their intention to use the MiDR for the purposes of MU once it became operational.

> "[W]e spent a fair amount of time attempting to educate . . . and to recruit the dental community to the registry. . . . I think they are beginning to . . . understand the value of the electronic health record and . . . that there are federal dollars available to help them transition . . . to the electronic health record."
>
> *— Program leader*

Altarum deliberately leveraged the MiDR as an MU registry to engage dentists who were largely unfamiliar with the CMS program, according to the awardee. In addition, the American Medical Association increased the CME/MOC credits allocated to the program by 10 hours for a total of 30 credits because of the MCPP's quality improvement activities. Although Altarum did not seek this change, Altarum marketed the increase to help recruit primary care providers to the MCPP.

B. Implementation of the service delivery model

In the second year, Altarum and its partners implemented the MCPP as planned, without significant changes to the program design or implementation schedule. Altarum continued to recruit, train, and provide TA to primary care providers; expanded outreach to other providers, such as dental providers; and launched the SmileConnect website in February 2016, as planned.

However, the awardee encountered challenges to developing the MiDR, primarily stemming from coordination with Michigan DHHS, which resulted in delays in launching the health IT tool. Nonetheless, by the end of the eighth program quarter, the awardee team made considerable progress. For example, Altarum launched a pilot of the MiDR at a practice site in Muskegon, Michigan, with collocated dental and medical clinics. The pilot, which ran from June through December 2016, tested the MiDR's EMR module[6] and functionality as an MU registry. Altarum reached out to the EMR vendor to seek certification and integration of its module in the EMR product. According to Altarum, this vendor was highly receptive to making modifications on its end to facilitate integration of the MiDR module. Altarum planned to launch the web-based version of the MiDR in October 2016 and to pilot the EMR module early in the 10th program quarter.

According to self-monitoring data from the awardee, MCPP-trained primary care providers provided a substantial increase in the oral health care services that are targeted by the MCPP. As of the end of the eighth program quarter, the weighted rates of oral health screening, fluoride varnish applications, and dental home referrals increased by 81.5 percentage points, 68.5 percentage points, and 76.1 percentage points, respectively, between baseline and five to six months post-training. At the end of the eighth program quarter, Altarum was still waiting to obtain Medicaid data from the state in order to assess the impact of the MCPP via patient utilization data.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.

[6] Altarum's design of the MiDR includes (1) a web-based portal that is accessible to anyone with an Internet connection and user ID and (2) an EMR-based module. Altarum developed the EMR module around one EMR product that is commonly used by primary care providers serving children in Michigan.

- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The design of the MCPP builds on existing levers for oral health care in the state, such as Michigan Medicaid's policy that primary care providers trained in Smiles for Life can receive Medicaid reimbursement for providing oral health services. Under this policy, providers can participate in the Smiles for Life training online. However, the MCPP seeks to enhance the value of the Smiles for Life curriculum by providing live training and TA to help providers implement and adapt the intervention to their local practices.

> "I think [participation in the primary care provider training] was one of the best things we ever did. . . . It hasn't been out even a year, but I already see a difference and actually think it's helped for the rest of the family."
>
> — *Implementing physician*

In interviews, providers at two sites that implemented the MCPP described the ease of implementation for the program's interventions. Both practices noted that providing the oral health care services was superior to what they were doing previously. Furthermore, these sites viewed the benefits of the program for their patients as outweighing the costs of implementation.

Altarum's development of MiDR is another example of how the awardee used existing infrastructure and resources to build the MCPP. For example, Altarum and Michigan DHHS are working together to integrate the MiDR with the state's single web portal, which state employees and providers who treat children already use to access the Michigan Care Improvement Registry, a tool that collects immunization information for children. Altarum sought to link the MiDR to the state's single web portal to facilitate access to and use of the tool.

2. Implementation processes

Altarum leaders and staff identified five primary facilitators of program implementation: (1) engaging Michigan DHHS on provider certification and development of the MiDR; (2) engaging Michigan DHHS, Medicaid managed care organizations (MCOs), and providers on reimbursement for oral health services; (3) engaging early childhood education and dental providers in the SmileConnect website; (4) planning outreach to dentists after administering a survey to dentists; and (5) using feedback from providers to refine and tailor the training and TA. Altarum also noted several barriers to program implementation, including having to engage Michigan DHHS stakeholders in a manner that maintained their interest in and commitment to the MCPP and rolling out the provider training and TA program without an operational health IT system.

The Altarum–Michigan DHHS partnership continued to be a key facilitator of implementation of the MCPP and of the MiDR in particular. However, Altarum also noted the need to carefully navigate the relationship and continually engage stakeholders within DHHS to maintain commitment to the MCPP. Altarum TA staff established a close working relationship with the Michigan DHHS staff member who oversees the Smiles for Life training program for

the state, which benefitted implementation. For example, this working relationship enabled the awardee team to expedite completion of the Smiles for Life certificates. Further, due to the efforts of a program champion within Michigan DHHS, Altarum and key stakeholders within DHHS started to push forward on enabling the MiDR to be used through Michigan's single web portal for providers. Altarum's ability to fund the state's efforts on the health IT system through HCIA R2 funding also enabled the state to prioritize MiDR development among its competing priorities. Finally, in establishing the MiDR as an MU specialized registry, Altarum built capabilities within the health IT system to support statewide quality monitoring, which was the primary reason Michigan DHHS was engaged in developing and sustaining the MiDR. Despite the positive working relationships and many strengths of the partnership, the awardee team described a continued need to engage support for the program at DHHS.

Altarum leaders reported that another key facilitator was engaging Michigan DHHS, Medicaid MCOs, and providers to resolve barriers to reimbursement for oral health care services delivered by medical providers. In the fifth program quarter, trained practices encountered barriers to receiving reimbursement from Medicaid MCOs for oral health care services. This challenge initially raised concerns among the awardee team about the sustainability of the MCPP interventions due to the hassles of obtaining reimbursement. Altarum and Michigan DHHS worked closely together to resolve this challenge, primarily by engaging Medicaid MCO contract leads and encouraging them to educate the MCOs about the need to align with the state's policy of reimbursing for these services for providers certified in Smiles for Life. As of June 2016, program staff were confident this issue was mostly resolved. Altarum proactively addressed this and other challenges related to billing and reimbursement. Even before conducting training, Altarum staff began working with practices on billing processes—for example, by modifying the EMR and educating providers on the correct procedure codes to use. In doing so, Altarum aimed to ensure that trained practices had the infrastructure in place to obtain reimbursement for the targeted oral health care services.

Altarum launched SmileConnect in February 2016 as planned, but initial engagement with the site, particularly among early childhood educators, was lower than anticipated. To overcome the initial low use of the SmileConnect website, Altarum developed an outreach plan and implemented targeted strategies to engage education providers in posting requests to the website. For example, Altarum presented at a Head Start program in Flint. The early childhood program lead at Michigan DHHS also promoted SmileConnect in other outreach efforts related to oral health. To ensure that a supply of oral health providers and resources were in place to fulfill requests, the awardee team leveraged its connections throughout the oral health community; engaged additional foundations with interest in children's health, such as the Kellogg Foundation; and secured donations of dental supplies from various groups.

> "We're trying to gently launch this . . . because we don't want requests hidden away . . . that nobody's meeting. The intent is, before the end of this grant, every state in the country has access to this and is using it, which is really exciting."
>
> *— Program leader*

By the end of the three-year cooperative agreement, Altarum intends to launch SmileConnect nationally. As of the eighth program quarter, the awardee had engaged 16 dental and dental hygiene programs in seven new states to participate in the website. Altarum plans to continue to recruit dental schools in other states to register as potential providers of dental services. However, to expand the website nationally, one of the key challenges to resolve is Altarum's large role in the administration of the website. Altarum manages site requests and verifies the authenticity of providers who indicate that they can fulfill a request. The awardee expects to continue to provide this service to ensure success and satisfaction among users. An additional challenge that Altarum faces is streamlining and automating the delivery of supplies. Altarum handles the shipping of all dental supplies from SmileConnect donors to requesters, a practice the Altarum team recognized is not sustainable or scalable. Altarum has explored ways to connect dental supplies directly to requesting sites.

To support the MCPP overall, Altarum planned its engagement of dental providers by conducting a survey of dentists, in partnership with the Michigan Dental Association. The goals of the survey were to (1) assess potential barriers to dental access that may be related to dentists' willingness to see patients who are 3 years old or younger, and (2) identify dental providers' IT capacity in order to inform development of the MiDR. One of the survey findings was that dental providers indicated interest in continuing education around treating very young patients. Altarum intended to use the survey results to engage UM and the Michigan Dental Association in developing continuing dental education programming related to treatment of young children to support the MCPP.

Altarum and its partners used a variety of types of monitoring data to inform and refine their training and TA activities. The Altarum team used feedback from the two pilot sites that participated in Year 1 to adapt the training and TA. For example, observations from the pilot sites supported revisions to training related to incorporating the MCPP into the workflows for well-baby or well-child visits. In addition, Altarum used feedback from provider surveys to adapt the training to address major concerns from providers, such as fear of biting during oral exams and fluoride varnish application. Altarum CME and TA teams also met monthly to review site-specific data on the rates of oral health screening, fluoride varnish applications, and dental home referrals. These data were collected and reported to Altarum as part of the CME/MOC program and were used to identify underperforming sites and develop site-specific strategies for TA to improve a site's performance. Altarum's partners viewed the primary care provider training and TA staff as being receptive to feedback and able to make appropriate adjustments to the training based on the provider feedback and monitoring data.

3. Organizational and external context

As described above, Altarum continued to engage stakeholders within Michigan DHHS to build a positive partnership. However, one of the key challenges Altarum faced was navigating the organizational boundaries within Michigan DHHS. Altarum noted the critical efforts of one of the program's champions within the state's Medicaid agency in helping to resolve the Medicaid MCO reimbursement challenges and connecting Altarum to the right people within DHHS to move the MiDR forward. However, Altarum continued to face challenges in obtaining Medicaid data from the state, a process that depended largely on efforts of individuals who were

not closely involved in the MCPP. By the end of the eighth quarter, Altarum had still not received the data.

The implementation of the MCPP has been facilitated by several state and national policies, including Michigan's efforts to increase access to dental providers and the CMS EHR incentive program. Awardee staff continue to view the statewide expansion of Healthy Kids Dental—Michigan Medicaid's dental benefit program, which provides dental reimbursement that is more analogous to commercial insurance—as a key facilitator for MCPP participation and implementation, by increasing access to dental providers who accept Medicaid patients. As of summer 2016, 83 percent of Michigan dentists were participating in Healthy Kids Dental and were therefore willing to accept Medicaid patients. Altarum and its partners leveraged the expansion of Healthy Kids Dental to the remaining three counties (Kent, Oakland, and Wayne counties) in October 2015 to educate the dentists in these counties about both Healthy Kids Dental and the MCPP.[7] Further, Michigan DHHS has participated in CMS's oral health collaborative, which has focused on increasing beneficiary access to services. As such, the state and Delta Dental are actively working on engaging dental providers and promoting awareness of the MCPP among beneficiaries of Healthy Kids Dental.

C. Development of the payment model

After encouragement from the HCIA R2 payment model TA team and CMS, Altarum decided to postpone development of a new value-based payment model in favor of building the case for adoption of the payment changes for the Medicaid pediatric population leveraged by the MCPP. As noted above, Altarum's program complements the expansion of Michigan's Healthy Kids Dental program, an enhanced dental benefits program. Healthy Kids Dental includes increased reimbursement rates for dental procedures and expansion of the pool of beneficiaries who are eligible for dental coverage through Medicaid. Altarum also leveraged Michigan Medicaid's policy to reimburse appropriately trained medical providers for the provision of oral health care services, by providing training and TA to support the provision of oral health care services among primary care providers.[8] To build the business case for the payment model, Altarum sought to conduct data analyses regarding the potential benefits of these three elements: (1) enhanced dental reimbursement, (2) medical reimbursement for oral health care services, and (3) provider TA to support the provision of oral health care services. One barrier Altarum faced in developing this evidence base was securing Medicaid data from Michigan DHHS. While waiting for Medicaid data from the state, Altarum used Medicaid Analytic eXtract (MAX) data from 2012 for baseline analyses as a work-around.

[7] In October 2015, the state expanded Healthy Kids Dental to children under age 13 in Kent, Oakland, and Wayne counties—the last three counties in Michigan to get the dental program. Effective October 1, 2016, the state implemented full coverage of children in Healthy Kids Dental, extending the eligibility age of the statewide program to 20 years of age. Thus, all Medicaid children in the state under 21 years of age became eligible for Healthy Kids Dental.

[8] Most, but not all state Medicaid programs, reimburse medical providers for the provision of oral health care services.

Altarum planned to engage Michigan DHHS, commercial payers, and Medicaid agencies in other states with findings from its planned data analyses. Altarum also planned to use findings from the aforementioned analyses to engage Michigan DHHS and local commercial payers in funding the MCPP TA program and implementing the value-based payment model that the awardee team had originally planned. Altarum anticipated, however, that it might encounter barriers to engaging Medicaid MCOs in the payment model because of "churn" among the Medicaid population, in which individuals lose and gain Medicaid coverage. Because these individuals frequently change health insurance coverage, health insurers (private or public) may not reap the benefits of investments in interventions such as the MCPP, which take time to accrue. Therefore, MCOs, which contract with the state on a time-limited basis, face uncertainty about realizing financial benefits of the MCPP or other prevention efforts, which may ultimately inhibit their engagement in the payment model. Altarum also planned to conduct widespread outreach to other Medicaid agencies, for example through the National Association of Medicaid Directors, to inform policymaking in other states.

Because of the diversity of the interventions and strategies used in the MCPP, Altarum anticipates that no one stakeholder stands to experience all of the program's benefits. Therefore, Altarum is seeking to make the case for program sustainability on a targeted basis, seeking to sustain SmileConnect, the MiDR, and the TA component through different vehicles. For example, Altarum will seek philanthropic funding for SmileConnect, while it will work with the state and Delta Dental to secure financing for the MiDR. It is also considering seeking funding from the Health Resources and Services Administration or other government agencies to maintain the provider TA program.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Altarum Institute

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	Not applicable; beneficiaries will be attributed to providers, and sample will be very large
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,932
Likelihood of all-cause hospitalizations	2,219
MDE sample size requirement to detect 20% effect	
Total expenditures	733
Likelihood of all-cause hospitalizations	555
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable. Expect to select a comparison group
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core Outcomes Estimation Method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician and staff surveys
Implementation data that will be analyzed	Google analytics; some utilization data

DDB = difference-in-differences Bayesian.

We anticipate being able to construct a valid comparison group by drawing from the pool of practices that were not yet participating in the program during the first 18 months of program operations. Although comparison providers will come from different geographic areas of the state than treatment practices, we expect to be able to draw a well-matched comparison group by matching on practice characteristics (such as urbanicity, size, and characteristics of the patient panel). We will then have a large analysis sample consisting of beneficiaries who have visited treatment or comparison practices.

V. NEXT STEPS

A. Implementation evaluation

As Altarum enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis will begin when we receive Medicaid encounter data from the awardee in spring of 2017. Although Altarum encountered many challenges in obtaining Medicaid data, the awardee finally received these data in March and April 2017. Altarum will pass the data along to us after reviewing and confirming that there are no apparent data issues. At that point, we will identify treatment group practices in the claims and construct a potential comparison group composed of practices in the state of Michigan that are not enrolled in the intervention as of its 18-month mark (November 8, 2016). We will then attribute Medicaid beneficiaries to both treatment and comparison practices. Next, we will use propensity score matching techniques to select comparison group practices (from the pool of potential comparison practices) that are similar to participating practices in terms of key characteristics such as whether they are located in a medically underserved area, urbanicity, practice size, and patient panel characteristics. After we select a comparison group, we will estimate impacts and describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with Altarum.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with Altarum.** Eligible clinicians include physicians, dentists, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, which is scheduled to be launched in March 2017.

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APPENDIX B.4.

AMERIGROUP

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MATHEMATICA Policy Research

REPORT

APPENDIX B.4

HCIA Round Two Evaluation: Amerigroup

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Coaching and Comprehensive Health Supports (COACHES) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Amerigroup's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Amerigroup and is implementation partner, Families First, made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Amerigroup and Families First addressed the issues identified during the first program year? What factors have influenced their ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Amerigroup's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the COACHES program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Amerigroup, the sole Medicaid managed care provider for Georgia's foster care program, received an HCIA R2 award to implement COACHES (key program characteristics are noted in Table 1). Through COACHES, Families First (Amerigroup's implementation partner) connects youth who are about to transition out of foster care to a coach who teaches them how to access, coordinate, and manage health and social services on their own. The program serves youth who reside in the metropolitan Atlanta, Macon, and Columbus regions of Georgia. The program was launched on March 1, 2015, and Amerigroup's goal is to enroll 720 youth during the three-year cooperative agreement. Although the awardee initially expected participants to be enrolled in COACHES for 12 to 18 months, youth have typically remained in the program for around three months only.

Families First is providing all services offered through the program. The agency receives self-referrals to COACHES from youth as well as referrals from community partners, including foster care providers. Unlike many other programs for foster care youth, participation in COACHES is voluntary; participants determine how often they meet with their coaches and the focus of their work. When a youth enrolls in the program, a coach completes a series of standardized psychosocial and trauma assessments to understand the youth's strengths and needs. Then, the youth and coach work together to develop a plan that lays out the steps that the youth can take to meet his or her medical, educational, employment, and social goals. During their meetings with youth, coaches educate them about the health care and social services systems, help them build life skills, and support them as they advocate for their own needs. To improve service coordination, coaches also facilitate communication and information sharing between youth, their various service providers (such as medical, behavioral health, and foster care providers), and informal supports (such as religious leaders or family members).

Amerigroup reimburses Families First for all costs it incurs in implementing the program. Though details are still under development, Amerigroup planned to transition to a value-based purchasing arrangement with Families First to cover program services over the course of the cooperative agreement. Amerigroup's intent is that the payment model developed by the end of the three-year cooperative agreement will be actuarially sound, thus making COACHES marketable to child service agencies.

Amerigroup hypothesizes that foster care youth who work closely with a coach will better understand what services they need and how to access them. The knowledge gained from this relationship will, in turn, result in better health and social outcomes, as well as lower costs. The specific program goals are to (1) boost health literacy, (2) increase the use of primary care and preventive services, (3) improve educational attainment and increase employment, (4) improve connections to peer and adult social supports, (5) improve life skills—including taking responsibility for renting an apartment and household budgeting, (6) expand knowledge of the legal and juvenile justice systems, and (7) reduce the overall cost of care for high-risk youth in foster care.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Amerigroup during the first year of its cooperative agreement.

- From the executive leadership to the coaches who work directly with youth, staff at all levels were engaged in the program and shared a commitment to its success.
- The awardee enrolled 116 participants in the first program year, just shy of its target of 126.
- Coaches reported that they engaged youth in the program and that youth were taking additional responsibility for their health and social service needs.

We also identified several initial challenges in implementing the program and Amerigroup's strategies for addressing them.

- Caseworkers at the Department of Family and Child Services (DFCS)—potential referral sources for the program and important partners for improving service coordination—had not engaged with the program as anticipated. This problem persisted over the first program year despite Amerigroup's and Families First's numerous attempts to educate DFCS staff about the program and meet with them to discuss it.
- Program staff initially found it difficult to enroll youth. Amerigroup and Families First addressed this challenge by expanding the program's eligibility criteria and shifting their enrollment strategy by encouraging youth to self-refer to the program rather than solely relying on referrals from DFCS staff.
- It can be difficult to engage youth who will soon transition out of foster care—the target population for the program. To draw youth into the program and keep them involved, coaches emphasized during recruitment events and meetings with youth that the program is voluntary and driven by their needs and interests.

Finally, we identified several early lessons learned by Amerigroup in implementing its program.

- The voluntary, participant-driven nature of the program helped to encourage youth to enroll and stay in the program.
- Competing priorities limited the engagement of some potential program partners, which, in turn, hindered the coaches' ability to support care coordination.
- Program staff found that maintaining a flexible approach while implementing the program allowed them to address implementation challenges as they emerged.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Amerigroup made progress in the following areas:

- Amerigroup reached 58 percent of its three-year project enrollment target.

- Amerigroup's implementation partner, Families First, continued to work closely with youth to set goals and to develop plans for achieving them.
- Amerigroup did not make significant progress on its payment model. Amerigroup's work on its payment model was delayed because recruiting participants and refining the service model took more resources and time than anticipated.

Over the past year, Amerigroup also made several changes to its program:

- The awardee opened a new program office in an additional rural area (Columbus, Georgia).
- Amerigroup and Families First implemented new processes for tracking referrals and enrollment numbers, as well as the services provided to participants. Program staff used the resulting information to better target their outreach approach and standardize service delivery.
- Families First strengthened its training program and supervisory structure for coaches. Coaches reported that the changes contributed to a positive, supportive work environment.
- Coaches began hosting group education sessions, called huddles, for youth.

Below we note the key challenges that Amerigroup has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Foster care providers continued to be less engaged in COACHES than anticipated. To boost their engagement, Families First centralized provider outreach, contacted providers more often, and offered them training opportunities. Although challenges remain, Families First reported that these efforts resulted in more referrals from, and better coordination with, foster care providers in the second program year.
- Amerigroup reported that participants' hectic schedules, lack of trust in the foster care system, and behavioral health issues can make it challenging for coaches to engage participants. As a result, the program is serving youth for approximately nine months less than expected. In response, the program staff streamlined their assessment process and adjusted their coaching strategy to maximize the program's impact during the shorter-than-anticipated enrollment period.

As Amerigroup enters the final year of its cooperative agreement, it is anticipating the following challenges and successes.

- The awardee indicated that it might be difficult to demonstrate program impacts because its evaluation was delayed and because youth are enrolled in the program for nine months less than intended. Amerigroup and Families First hired an evaluation specialist to help them address these challenges in the final program year.
- Amerigroup expected potential funders to be interested in the program given the desire from child service agencies to reduce costs for high-need youth, including transition-age youth.

Table 1. Amerigroup: COACHES characteristics at a glance

Program characteristic	Description
Purpose	The COACHES program connects youth who are about to transition out of foster care with a coach who teaches them how to access, coordinate, and manage health and social services on their own.
Components	• Patient and family engagement • Care management services • Outpatient care coordination
Target population	Youth who have the following characteristics: • In foster care for 12 months or longer[a] • 17 to 20 years old • Documented history of behavioral health needs • Reside in participating counties
Theory of change/theory of action	Amerigroup hypothesizes that youth who work closely with a coach will better understand what services they need and how to access them. The knowledge gained from this relationship will, in turn, result in better health and social outcomes, as well as lower costs.
Payment model	Value-based payments, bundled or episode payment
Award amount	$5,833,492
Launch date[b]	3/1/2015
Setting	• Community • Home
Market area	• Rural • Urban • Suburban
Market location	GA (Bartow, Bibb, Carroll, Cherokee, Clayton, Cobb, Dawson, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Muscogee, Paulding, and Rockdale counties)
Core outcomes	• Improved health literacy and ability to navigate the health care system • Increased use of primary care and preventive services • Improved educational attainment and increased employment • Improved connections to peer and adult social supports • Improved life skills (including renting an apartment and household budgeting) • Increased knowledge of legal and juvenile justice systems • Decreased overall cost of care for high-risk foster care youth

[a]Amerigroup initially targeted youth in foster care who reside in group homes only. Through two waves of eligibility expansions, Amerigroup opened the program to youth who are enrolled in an independent living programs (ILP) or who reside with foster families.

[b]After a planning period, the awardee's program began to operate as of this date.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Amerigroup in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 20 through July 6, 2016. For the analyses of Amerigroup's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at Amerigroup and Families First
- A program manager
- Four coaches (a senior and a junior coach working in metropolitan Atlanta and a senior and a junior coach working in rural counties)

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

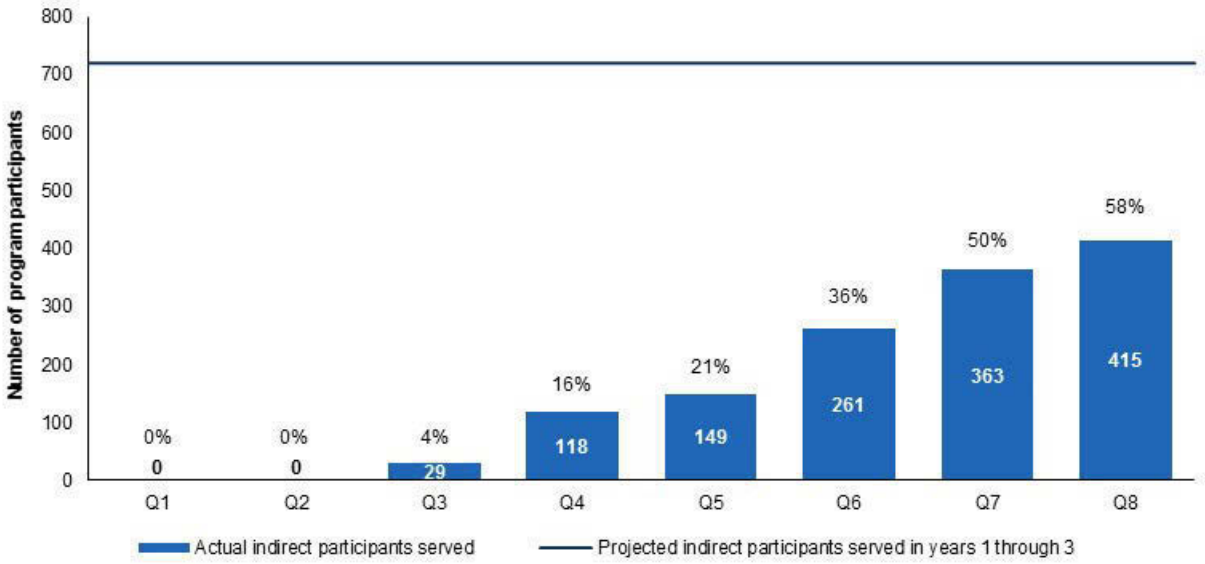
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Amerigroup's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Amerigroup reported to the implementation and monitoring contractor that it indirectly served 415 participants from March 2015 (the launch of its program) through August 2016, which represents about 58 percent of its 720 projected indirect participants (Figure 1). The baseline characteristics of participants who we are able to identify in Medicaid fee-for-service enrollment and claims data will be included in future reports.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. Amerigroup does not have direct program participants.

Amerigroup made significant progress towards its three-year enrollment goal during the second program year. After struggling with enrollment early in the program, Amerigroup adjusted its recruitment strategies. Most notably, during the first program year, Amerigroup started pursuing self-referrals from youth instead of relying only on referrals from providers. The awardee also expanded the eligibility criteria to include youth residing in additional counties and those not residing in group homes.

To boost enrollment even more, Amerigroup implemented a new process for tracking referrals in the second program year. The awardee started producing weekly reports that track the number of and demographic information for referred, eligible, and enrolled participants. Amerigroup used the resulting information to refine its outreach and enrollment approach. For example, recognizing that individuals who were too young to participate were often referred to the program, Amerigroup set up a process to quickly enroll interested youth when they turn 17.

Amerigroup opened an office in Columbus, Georgia to serve youth in an additional rural area. Program leaders reported that youth in rural areas were more likely to express an interest in and remain engaged with the program than youth in urban areas because there are fewer supports for foster care youth in rural communities.

Program staff also adjusted their outreach approach to referral providers. In the second program year, foster care providers continued to refer far fewer participants to COACHES than initially anticipated. In addition, some providers were hesitant to approve participation for youth who had self-referred to the program. Program staff attributed the low engagement to providers' limited time and resources, their lack of knowledge about the program, or their perception that the program duplicated services that they were already offering.

To make providers more comfortable with the program, Families First centralized its outreach approach. Only program leaders (as opposed to any staff) educated providers about the program, and one staff person served as the referral providers' main point of contact. In addition, Families First instituted an electronic referral process to make referrals easier and more secure. Although challenges remain, the awardee reported an increase in the number of referrals from providers at two program types—Room, Board, and Watchful Oversight (RBWO) programs and the Independent Living Program (ILP)—as a result of their efforts. In the program's final year, Amerigroup plans to hire a marketing manager to further increase referrals.

B. Implementation of the service delivery model

Amerigroup continues to be on track with the implementation of its service delivery model and did not make significant changes to its model in the second program year. Coaches continued to work closely with youth to set goals and to develop plans for achieving them. As of May 2016, around three-quarters of all participants had developed a skills plan in partnership with their coach. As in the first program year, youth focused most often on education- and employment-related goals in their plans. Though they still gave less attention to health-related goals, coaches reported that youth set more of these goals during the second program year. They include, for example, identifying a primary care provider or discussing prescribed psychotropic medication with their provider.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Program staff reiterated that the youth-focused design of COACHES not only helped to keep youth engaged but also empowered them to take control of their health and social service needs. In the second program year, program staff renewed their efforts to make the program even more centered on youth. For example, staff held focus groups with youth to gain their feedback on how to improve the design of the program. In addition, coaches charged participants with selecting the program's logo and tagline. Their final choice was: "Be Motivated to Plan for Your Future."

> "COACHES is really driven by the youth need or youth goal. . . . We really would be remiss if we didn't focus on what the youth really wanted to focus on."
>
> *— Program leader*

2. Implementation processes

Amerigroup focused on improving its self-monitoring process and standardizing its service delivery structure during the second program year. Families First refined its feedback reports so that it could more comprehensively monitor how often coaches have contact with youth, the timeliness and completeness of assessments and skills plans, and the number and type of referrals to community resources. Families First observed, for example, that participants were only following up on about half of the referrals that coaches made to community resources. Amerigroup and Families First also used the information from the reports to flesh out the program manual and to develop program fidelity checklists for coaches. In the manual, for example, the awardee formalized the program's disenrollment process, including reducing the amount of time coaches spent reaching out to nonresponsive participants at the expense of being able to enroll interested youth. Compared with the first program year, supervisors shared findings from formal reports with coaches more regularly.

> "It is all about tightening up our processes—making sure everything is documented, making sure that we have a truly canned product that can be modeled elsewhere. . . . Just ensuring that all of our processes and ducks are in a row."
>
> *— Program leader*

Staff generally felt that the new self-monitoring process was useful, though a few people raised concerns. Several program leaders indicated that the feedback reports would be more useful if coaches more consistently documented services in the program's electronic record system and if the system had more analytic functions. In addition, some coaches felt that the monitoring process became too focused on tracking quantitative outcomes as opposed to using case conferencing to identify and discuss barriers. In response, Amerigroup gave coaches more opportunities to make use of the latter approach.

Ongoing training opportunities and a supportive supervisory structure contributed to the coaches' job satisfaction and their ability to effectively engage with youth. In the second program year, Families First refined its training for new coaches so that it would be responsive to staff preferences (such as relying more on in-person training sessions rather than webinars). Families First also certified additional trainers so that new coaches were trained more quickly. In addition, program leaders offered existing coaches ongoing training on topics identified as important by program staff, including proper electronic medical record (EMR) documentation;

preventing dating violence among teens; suicide prevention; and resources for foster care youth in Georgia.

Coaches also reported that they felt comfortable raising questions and problem solving with their supervisors. Coaches reported that their supervisors created a positive, supportive work environment that stressed self-care and continuous quality improvement. To maintain this level of support as the program grew, Families First increased the number of supervisors from three to five so that no one supervisor oversees more than nine coaches.

> "It's very beneficial having a lead coach there, giving encouraging words when you're doing good. And also, if he sees something you could improve on, goes ahead and tells you right then."
>
> — *Program coach*

Limited provider engagement made it challenging for coaches to help youth coordinate services and achieve their goals. Coaches help youth to coordinate the services they receive from medical and behavioral health providers, DFCS, and community organizations. As in the first program year, however, coaches had few opportunities to discuss care plans with other providers, and in some cases, providers undercut the coaches' attempts to work with youth. For example, one group home restricted the times that coaches could meet with participants at home.

> "When the case workers don't call us back or respond to our emails, they make it hard for us to go to the next step. . . . If we need something from the case worker to help [the youths] with their goals and we're not able to reach them, it makes the process difficult."
>
> — *Program coach*

To overcome these challenges, Families First pursued new provider outreach strategies. The ones intended to increase referrals, outlined in Section III.A, were also intended to encourage providers to remain involved in the program. In addition to these strategies, Families First instituted new procedures requiring coaches to reach out more proactively to providers to discuss the youth's skills plans. To motivate providers to do work with coaches, Families First offered them training opportunities. Through these combined efforts, some coaches reported better coordination with foster care providers during the second program year. For example, one coach started working closely with the group home staff to help youth reach their goals. Specifically, the group home relaxed its curfew so that a participant who was focused on employment goals could accept a night job that would prevent the participant from getting home before the 9 p.m. curfew.

3. Organizational and external context

Families First's culture facilitated program implementation. Coaches appreciate the fact that their colleagues, including those not directly involved with the program, helped them to think through challenging situations and identify community resources that might be helpful to participants. In addition, the coaches indicated that Families First's supportive culture helped them to cope with the emotional strain of working with a high-need population. Finally, program staff indicated that leaders at both Families First and Amerigroup made in-house resources, including subject-matter and information technology (IT) experts, available to support implementation. For example, an education consultant at Families First helped one youth to

identify and secure transportation resources so that he could remain at his school after moving to a group home in a different district.

Moreover, the program leaders and staff are committed to and believe strongly in the program. For example, program leaders indicated that coaches meet with youth outside of regular business hours, empathize with them when discussing difficult situations, and develop creative ways to engage them (such as using super-hero-themed group activities). As in the first program year, program leaders continued to attribute much of the program's success to the staff's dedication to and skills working with the programs' target population.

However, the program serves a high-need population, so keeping participants engaged is a challenge. Coaches indicated that the participants' hectic schedules or behavioral health challenges sometimes result in youth not responding to their coach's phone calls or missing their appointments. Amerigroup reported that, through May 2016, around a quarter of the coaches' contact with youth was devoted to scheduling meetings as opposed to delivering services. In addition, as in the first program year, coaches reported that youth often decide to leave foster care at age 18, making them ineligible for the program. Coaches indicated that convincing youth to remain in care is difficult because many youth have a deep distrust of the foster care system. As a result of these difficulties, coaches are working with youth for a median of 3.3 months, considerably less than the 12 to 18 months initially intended.

Staff refined the program to improve youth engagement and to account for the shorter-than-anticipated enrollment period. For instance, coaches streamlined the assessment process and focused on fewer, higher-priority goals with youth to maximize the program's impact while they are enrolled. Coaches also tested youth-friendly communication and education strategies. For example, to ease anxiety about the program, coaches encouraged youth who set challenging goals to take small, manageable steps toward achieving them, such as developing a resume or reviewing a medication list. As another example, coaches started texting youth instead of calling them to schedule in-person meetings and to check in on progress toward their goals. In addition, coaches realized that youth appreciate opportunities for peer-to-peer interactions, so they began to host group education sessions, called huddles.

C. Development of the payment model

As of August 2016, Amerigroup had not made progress on its payment model. Development was delayed because recruiting participants and refining the service model took more resources and time than anticipated. To overcome the delay, Amerigroup and Families First will focus on payment model development during the final program year. Specifically, they will assess cost savings from the program and meet with potential funding partners. Recognizing that program benefits may accrue to multiple child service agencies, Amerigroup will meet with a variety of potential funders, including Medicaid, DFCS, and the Georgia Welfare Reform Council. The final payment arrangement may include incentive payments if Families First demonstrates that it has improved health and social service outcomes for participants.

Amerigroup indicated that child service agencies and providers have expressed an interest in programs that target high-cost populations, including transition-age youth. Providers in rural counties that are not currently served by the program, for example, have asked the awardee to introduce it in their area. As another example, Amerigroup's parent company, Anthem, may

expand COACHES to additional service areas or populations, such as youth who come into contact with the juvenile justice system. Amerigroup is hoping that this general interest will help them to start a conversation with potential funders.

However, Amerigroup noted that it was difficult to have meaningful, productive conversations with potential funders without outcomes data. Demonstrating impacts from the program may be difficult given that youth are enrolled for nine months less than anticipated. In the second program year, Families First hired a senior evaluation consultant to adjust its monitoring and evaluation plan, and its data collection instruments to track more proximal outcomes (such as resume development) in addition to longer-term impacts (such as job attainment). While Amerigroup refines its evaluation approach, it is drawing on the underlying evidence it used to develop the program (such as promising findings from evaluations of similar models) to begin talking with funders.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Amerigroup

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	545
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,932
Likelihood of all-cause hospitalizations	2,454
MDE sample size requirement to detect 20% effect	
Total expenditures	733
Likelihood of all-cause hospitalizations	614
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few beneficiaries to detect core outcomes
Survey data for treatment group that will be analyzed	Staff survey
Implementation data that will be analyzed	Beneficiary surveys

At this point, we do not anticipate being able to conduct a rigorous impact analysis for Amerigroup. It would be difficult for Amerigroup's program to affect claims-based outcomes during the study period because many of the outcomes that the awardee anticipates affecting are not observable in the Medicaid claims data (such as the participant's health knowledge, education, employment, and life skills). In addition, the sample size is not large enough to be likely to detect any of CMS's core measures. We do plan to explore the possibility of analyzing the survey data collected by the awardee as well as the services that participants' received.

V. NEXT STEPS

A. Implementation evaluation

As Amerigroup enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The awardee submitted a finder file in fall 2016. Baseline characteristics have not yet been analyzed because enrollment is lower than expected, and we initially had difficulty linking many enrollees to Medicaid data claims. We are currently working to resolve these issues, and we expect to analyze the baseline characteristics of participants by using Medicaid claims and enrollment data in early 2017. However, it is not clear whether there will be enough participating Medicaid beneficiaries to support an impact analysis; moreover, many of the outcomes the program is likely to affect may not be captured in the Medicaid claims data.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we administered a survey to non-clinician staff affiliated with Amerigroup during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on participant outcomes. Examples of non-clinician staff include coaches and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

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APPENDIX B.5.

AVERA HEALTH

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REPORT

APPENDIX B.5

HCIA Round Two Evaluation: Avera Health

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Avera Health's eLongTermCare (eLTC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Avera's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Avera made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Avera and its participating sites addressed the issues identified during the first program year? What factors have influenced the awardee's and its sites' ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics for the treatment and control groups of Avera's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the eLTC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Avera Health, a nonprofit integrated health system, received HCIA R2 funding to implement the eLTC program (see Table 1 for an overview of the program characteristics). Avera consists of regional hospitals, critical care centers, and skilled nursing facilities (SNFs) across the Upper Midwest. It is partnering with seven organizations to provide training and patient care services through a virtual, multidisciplinary, geriatric team for the staff and residents of 45 SNFs in Iowa, Minnesota, Nebraska, and South Dakota. The organizations include Continuum Health Care Services (a long-term care management and consulting organization), Evangelical Lutheran Good Samaritan Society (the largest nonprofit provider of senior care services in the country), Golden Living Centers (a senior-focused health care company),[2] Sunrise Retirement (a retirement community offering various living options for seniors, including skilled nursing care), Trinity Health (an integrated health care system that includes SNFs), Veterans Home (an organization that manages living options for veterans, including skilled nursing care), and Welcov Healthcare (an organization that manages long-term and short-term living options for individuals).

The eLTC program was launched on November 1, 2014, and serves all residents in the 45 participating SNFs. There is no minimum or maximum period in which SNF residents participate in the program. Individuals admitted to or residing in any of the SNFs are considered to be enrolled, although residents may decline services. All enrolled residents are considered to be indirect participants because all SNF staff who interact with residents receive training under the HCIA R2 cooperative agreement. However, some of the indirect participants are also considered to be direct participants because they receive tele-health services that are not covered under Medicare but are funded directly by HCIA R2. For example, this group of participants includes people who reside in urban areas, and people in rural areas who receive more than one tele-health visit per month. Program leaders have established an enrollment target of 7,100 participants across all 45 SNFs by the end of the three-year cooperative agreement.

The three main components of the eLTC program are:

1. **Tele-health consults** for urgent or specialty care for participants in the 45 SNFs. Facility staff are encouraged to call eLTC providers (located at Avera's central office in Sioux Falls, South Dakota, 24 hours a day, seven days a week) whenever a participant needs urgent medical care. Then, eLTC providers evaluate the participant via direct two-way audio and video. For example, a participant who is having trouble breathing is evaluated virtually by eLTC providers, who then decide if the individual needs to be transferred to the emergency department (ED) or if he or she requires medication. For non-urgent specialty care, eLTC staff work with Avera specialists to schedule tele-health visits. Specialists have the necessary telemedicine equipment in their offices.

[2] Golden Living Centers is planning to sell its SNFs to another entity; the sale will affect 10 SNFs that are participating in Avera's eLTC program. Although a date of sale has not yet been established, Avera reported that it is working with the long-term care provider organization to consider whether and how the 10 SNFs can continue participating in the program after the Golden Living Center SNFs are sold. This information was obtained in September 2016 through correspondence with CMS.

2. **Tele-health transitional care coordination from a hospital to a SNF.** After reviewing the medical records of newly admitted residents, eLTC staff use a risk-stratifying approach to determine the participants' risk for either an ED visit or a hospital readmission. High-risk participants receive a full geriatric evaluation and a tailored program referred to as an ePlan. The ePlan may include chronic disease management, the development of a schedule for how often the participant will be evaluated by video or telephone, and the creation of a task list by eLTC staff for SNF staff to follow. For low-risk participants, eLTC providers review medication lists and provide any medication recommendations to the primary care physician (PCP) or a SNF nurse. In addition, they may provide an ePlan at the SNF's request and have a video call with participants.
3. **Quality improvement, referred to by eLTC leaders as staff training and empowerment.** Early in the program, eLTC leaders provided support to SNF staff both in person and via video as SNFs adopted a quality improvement program called Interventions to Reduce Acute Care Transfers (INTERACT),[3] which is only a part of Avera's planned quality improvement component. In addition, program leaders identify other training topics for bimonthly educational sessions provided through eLTC to all sites; the topics are selected on the basis of program monitoring data and feedback from SNF staff.

The first two program components described above use the mobile tele-health carts. At the beginning of the program, eLTC leaders conducted a one-hour training for SNF staff in use of the mobile carts. Leaders retrain SNF staff as needed. For tele-health urgent care consults, SNF staff move the mobile cart to the participant's room before or after calling eLTC to request an urgent consult; consults generally take place within 20 minutes of when SNF staff contact an eLTC provider. For transitional care coordination services, eLTC staff first review the medical information on newly admitted residents and identify those who are at high risk for an ED visit or a hospital readmission. The staff then ask SNF staff to set up tele-health visits with the high-risk residents and to use the mobile cart at the scheduled time.

Program leaders are exploring two options for a payment model. The first is a retail subscription model, a business model in which SNFs make advance payments to use eLTC services for a specified period, such as each month or quarter. In the second option, eLTC services would be reimbursed through existing chronic care management and transitional care management current procedural terminology (CPT) codes. Aside from the payment model, Avera is using incentive payments for participating sites during the cooperative agreement.

Program leaders hypothesize that by relying on a geriatrician-led team to provide virtual health care services to residents of SNFs and by improving staff training, the program will better meet participants' medical needs and, in turn, reduce total costs, hospitalizations, and ED visits. Avera's goals for program participants are to reduce the following by August 31, 2017: (1) transfers and ED visits by 28 percent, (2) hospitalizations by 16 percent, and (3) total cost of care by 8.25 percent.

[3] The three INTERACT tools initially promoted in the eLTC program are the (1) SBAR (Situation, Background, Assessment, and Recommendation); (2) Stop and Watch; and (3) Care Paths. For more information, please see https://interact2.net/index.aspx.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Avera during the first year of its cooperative agreement.

- The targeted 30 SNFs were participating in the eLTC program after Avera successfully installed mobile tele-health carts in each facility and resolved early issues related to poor Internet connectivity.
- SNF staff believe that the eLTC program is improving care by providing timelier, geriatric-focused care.

We also identified several initial challenges in implementing the program and Avera's strategies for addressing them.

- Physician resistance to ceding their role in resident care reduced the likelihood that SNFs will use eLTC services. To address this challenge, program leaders started investing more time in meeting with reluctant PCPs in person and over the telephone. Avera found that once PCPs have tried eLTC urgent care services, they are more willing to try eLTC's more comprehensive transitional care coordination service.
- The ingrained habits of the SNF staff and their fear of new technology limited their use of eLTC and were difficult to change. The eLTC leaders started making SNF staff more comfortable with the equipment and with tele-health visits by retraining them and conducting more transitional care tele-health visits. Some SNF administrators encouraged staff to make greater use of eLTC services.

Finally, we identified several early lessons learned by Avera in implementing its program.

- Several factors must be considered in identifying residents most likely to benefit from eLTC transitional care coordination, including functional status, disease burden, and number of medications.
- A higher-than-expected turnover rate in SNF administrators required eLTC to develop and execute more formal communications in its recruiting process to ensure that the SNF administrators were not the only staff who had information about participation expectations.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Avera made progress in the following areas:

- Program staff said that the "consultative" and "supportive" feature of the eLTC program—through which SNF nurses are encouraged to call eLTC providers for general help and mentorship—emerged as a key feature of the program in the second year.
- Avera continued to refine the risk-stratification approach for identifying residents newly admitted to SNFs who are at high risk for or vulnerable to ED visits or hospital readmission.
- Avera continued to explore the possibility of a retail subscription model and reimbursement through chronic care management and transitional care management CPT codes. The awardee abandoned the possibility of a shared savings model.

Over the past year, Avera also made several changes to its program:

- The awardee replaced one SNF that was not sufficiently engaged in the program with another SNF that is under the same corporate leadership and whose staff expressed greater interest in the program. Avera also expanded the program to an additional 15 SNFs.
- To better align eLTC with the needs and characteristics of participating SNFs, Avera relied less on video consults (using telephone consults instead) and reduced its effort to promote the INTERACT quality improvement tools.
- To meet the growing needs of the program, Avera hired several staff to fill existing and newly developed positions at the eLTC central office. These staff include a director of operations, a social worker, a nurse practitioner of psychiatry, and advance practice providers (APPs), among others.

Below we note the key challenges that Avera has worked to address in the second year of its cooperative agreement.

- To increase enrollment, Avera stopped billing for tele-health visits so that all eLTC program services are free for residents. Avera also expanded the program from 30 to 45 SNFs while maintaining the original enrollment goal of 7,100 participants. The awardee also decided to host open houses to promote participation in eLTC.
- Avera continued to develop strategies to increase engagement in the program among PCPs who provide care to SNF residents. For example, program leaders began to interact with PCPs at new SNF sites before launching services, and they met with PCPs at all sites face-to-face and more frequently to explain the benefits of the program.
- Avera also continued to enact strategies to get SNF staff and the sites more involved in the program. Program leaders provided SNF staff with additional training on using the mobile cart. They also developed an orientation for new SNF administrators and a training video for new nursing staff. With regard to site engagement, Avera implemented a new transfer review process. Program leaders now schedule a conference call with SNF staff to discuss each unplanned transfer to an ED or to a hospital in which eLTC providers were not consulted by SNF staff. For the monthly reports, program leaders began to include graphs that rank and compare the participating SNFs' rate of unplanned transfers as a way to promote friendly competition and thus more active participation in eLTC.
- To improve the exchange of information between eLTC providers and the SNFs, as well as its own data collection, analysis, and reporting efforts, Avera began to deploy the new software program known as eLITE.
- SNF credentialing requirements and bylaws continue be a challenge because they prohibit eLTC nurse practitioners and physician assistants from providing medical care to residents at some SNFs. Avera is working with its credentialing department to ensure that eLTC providers are appropriately credentialed and with SNF administrators to revise bylaws.

As Avera enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee anticipates that readmissions penalties and other value-based payment policies for hospitals, under Medicare and possibly commercial payers as well, will continue to facilitate the adoption of the eLTC program, as hospitals will encourage SNFs to use programs such as eLTC to reduce hospital readmissions.
- Buy-in of the eLTC program continued to be limited among some PCPs employed at hospitals that compete with Avera system hospitals and among SNF residents who are seen by these PCPs. These PCPs remain concerned that they will lose patients who decide to transition to Avera PCPs. Some residents remain loyal to their PCPs and do not want to receive care from Avera providers, whom they see as competing with their PCPs.

Table 1. Avera: eLTC characteristics at a glance

Program characteristic	Description
Purpose	eLTC offers a set of geriatric care and tele-health services to residents and staff in SNFs. Services are provided out of a centrally staffed telemedicine hub in Sioux Falls, SD, and include: • Building the SNF care teams' capability and toolkits for assessing patients' medical needs • Providing SNF residents with routine and early access to goal-directed care, including urgent and specialty care • Improving the management of care transitions • Supporting the widespread use of tools and treatment algorithms among SNF staff by coaching them in both areas
Components	Telemedicine, transitional care coordination, and quality improvement
Target population	Patients admitted to any of the 45 SNFs participating in the program
Theory of change/theory of action	eLTC leaders hypothesized that by providing virtual services to SNFs and their residents the program would better meet participants' medical needs and, in turn, reduce total costs, hospitalizations, and ED visits.
Payment model	• Capitated payment for services (a retail subscription model i.e., a business model in which SNFs make advance payments to use eLTC services for a specified period, such as each month or quarter) • Possible new fee-for-service (FFS) payment (reimbursement through existing chronic care management and transitional care management fees)
Award amount	$8,827,572
Launch date[a]	November 1, 2014
Setting	SNFs (provider based)
Market area	Rural, urban, suburban
Market location	IA, MN, NE, and SD
Outcomes	By August 31, 2017: • Reduce transfers and ED visits by 28 percent • Reduce hospitalizations by 16 percent • Reduce the total cost of care by 8.25 percent

[a]After the initial planning period, the awardee's program began to operate as of this date.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Avera in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 29 through July 8, 2016. For the analyses of Avera's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Four program leaders at Avera's headquarters in Sioux Falls, South Dakota
- Three administrators and two frontline staff at three participating SNFs in two of the four states
- A corporate executive at one of the eight long-term care provider organizations whose SNFs are participating in the program

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

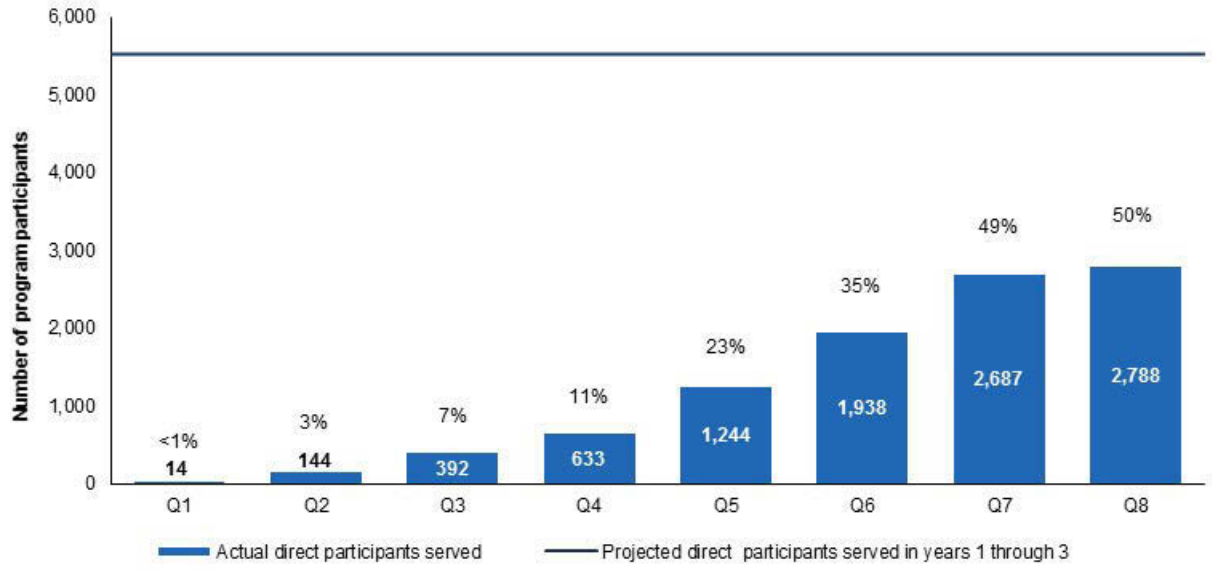
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Avera's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Avera reported to the implementation and monitoring contractor that it directly served 2,788 participants from November 2014 (the launch of its program) through August 2016, which represents about 50 percent of its 5,521 projected direct participants (Figure 1). Direct participants are SNF residents who receive tele-health consults or transitional care coordination services that are funded through the cooperative agreement. Avera also reported that it indirectly served 6,775 participants from November 2014 through August 2016, which represents about 95 percent of its 7,100 projected indirect participants (Figure 2). The indirect participants are all residents of participating SNFs. These individuals benefit indirectly, via higher quality care, from the quality improvement and staff training activities that SNF staff receive from eLTC providers. Some indirect participants may also receive tele-health services. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in Section IV.

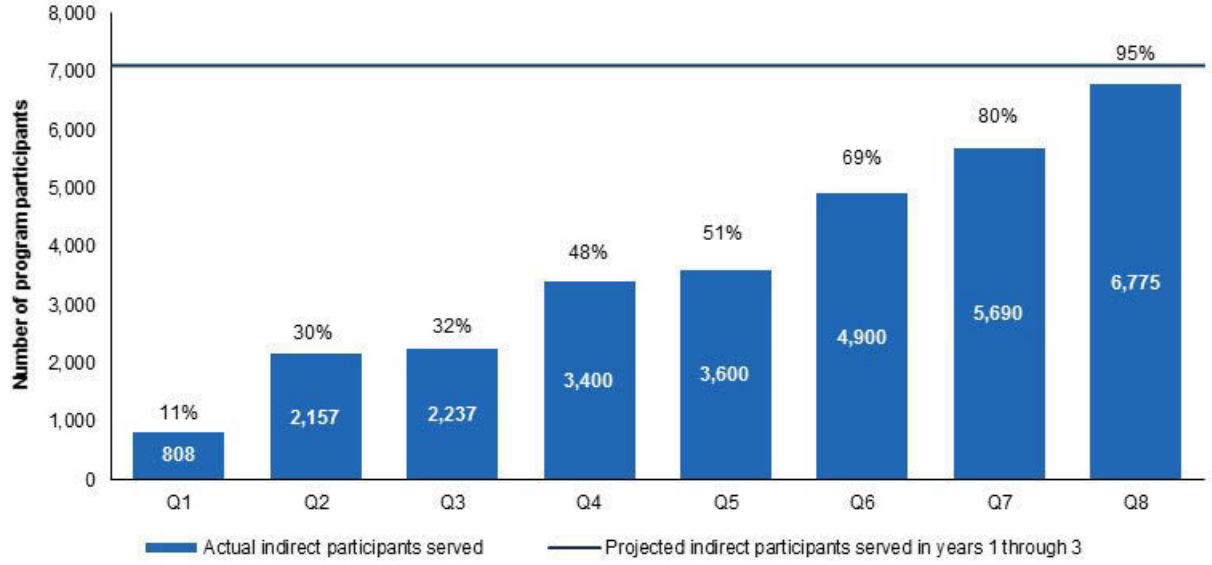
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Avera defines direct participants as those who receive tele-health services not covered under Medicare policy (e.g., participants residing in urban areas or those in rural areas receiving more than one tele-health visit per month); they receive eLTC services funded directly by the HCIA award.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Avera considers all enrolled participants (those residing in SNFs) to be indirect participants because all SNF staff who interact with residents receive training under the HCIA R2 award. Although all enrolled program participants are considered to be indirect participants, some indirect participants are also direct participants because they receive services not covered under Medicare policy and therefore receive tele-health services funded directly by HCIA R2. All of the direct participants for the eLTC program are also counted as indirect participants.

Avera believes that it will likely exceed its three-year enrollment goal primarily because of several actions it took during Year 2 to boost enrollment. First, Avera stopped billing for tele-health visits so that all eLTC program services are free for SNF residents. Program leaders reported that SNFs indicated that residents were less likely to participate in the eLTC program if there was a possibility that they would have a co-pay for services. In addition, the awardee dropped one SNF because it was not sufficiently engaged in the program and replaced it with another SNF under the same corporate leadership. Avera maintains strong working relationships with the long-term care provider organizations participating in the eLTC program, as corporate leaders from each organization sit on the eLTC steering committee. As a result, the awardee was able to work with the low-performing SNF's corporate leadership to replace the SNF with another SNF whose staff expressed greater interest in participating in the program. Because of this level of interest, Avera expects more residents to participate in the program, as SNF staff will encourage them to use eLTC services. Avera also expanded the eLTC program from 30 to 45 SNFs while maintaining the original enrollment goal of 7,100 participants across all participating SNFs by the end of the three-year cooperative agreement. CMS approved Avera's request to fund this expansion with carry over funds from Year 1. Lastly, Avera started to invest more time in meeting with SNF residents and their families. Although residents were generally open to participating in the eLTC program, a small number of them who are patients of PCPs working for hospitals that compete with Avera do not want to participate. Even though SNF staff

make it clear to the residents that, if they do need to be transferred, they will be transferred to the hospital of their choice, some residents remain loyal to both their PCPs and the competing hospitals, so they are reluctant to work with eLTC providers. Avera decided to host open houses for SNF residents and their families to promote the eLTC program by explaining to residents and families that it is intended to be a collaboration between PCPs and eLTC providers, regardless of the PCPs' hospital affiliation.

B. Implementation of the service delivery model

Avera continued to implement its service delivery model on schedule, and it made both major and minor changes to the model in the second program year. The awardee focused less on video consults (as opposed to telephone consults) and on the use of INTERACT tools. It also hired staff to meet the growing needs of the program.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Program staff pointed to four primary factors that have facilitated the implementation of the eLTC program: (1) the "consultative" and "supportive" feature of the program through which SNF nurses are encouraged to call eLTC providers for general help, (2) Avera's flexibility in how SNFs could adopt or implement the program components to meet their needs, (3) Avera's hiring of staff to meet the growing needs of the program, and (4) the awardee's work in refining the risk-stratification approach in an effort to ensure that it is identifying all of the newly admitted residents who need extra attention.

Program staff said that the "consultative" and "supportive" feature of the eLTC program—in which SNF nurses are encouraged to call eLTC providers for general help and mentoring in providing care to residents—emerged as a key feature of the program in Year 2. Program leaders did not expect this feature to be as valued as it has been by nurses. It cultivated their participation in the program and promoted learning among them. Nurses often call eLTC providers to get advice about non-urgent issues. One example is when a resident has a non-urgent fall, and the nurse is trying to assess whether the resident's medications caused the fall. Nurses also call eLTC providers to ask them to write orders and prescriptions for residents when the residents' PCPs are not immediately available. One SNF administrator said that nurses often feel more

comfortable calling eLTC providers with questions than asking the residents' PCPs who spend limited time at SNFs.

Participation in eLTC improved in Year 2 because Avera allowed flexibility in how SNFs could adopt or implement the program components to meet their needs. For example, the awardee placed less emphasis on tele-health video consults in general and for specialty care. Program leaders learned that many of residents' general medical issues could just as easily (and often more quickly) be handled by telephone than video. This was especially true as eLTC providers developed relationships with residents and SNF staff, making video communication less important for every encounter. With regard to specialty tele-health consults, program staff learned that some participating SNFs did not need support from the eLTC program because they had specialty referral processes in place with local hospitals. For SNFs that do not, however, have established referral processes and that do want to use the specialty care piece of the eLTC program, Avera continued to set up referrals for tele-health visits with specialists in its eConsult program—a tele-health service line similar to the eLTC program.

Avera also adopted a more flexible approach to its quality improvement component in Year 2. It reduced its effort to promote INTERACT tools because program staff learned that some of the SNFs added to the program in Year 2 already use a different quality improvement program. Program leaders also found that, although the INTERACT tools could help eLTC providers to understand residents' conditions and deliver timely care, the tools were not critical because much of the information documented in them could be orally communicated by SNF nurses to eLTC providers. Therefore, program leaders decided that the INTERACT tools are unnecessary as long as the SNFs have a quality improvement process in place and are working with Avera to review their eLTC service utilization and unplanned transfers to the ED and to hospitals.

To meet the growing needs of the program in the second year, including adding 15 SNFs and broadening of the scope of training services provided, Avera hired staff for both existing and newly developed positions at the eLTC central office. Two full-time APPs left the program because of the demands of geriatric care. The awardee replaced these staff and hired several other staff in Year 2, including (1) a director of operations, who will focus on the continued development of workflow processes, data reporting and analysis, and managing the implementation of the 15 SNFs new to the program; (2) a director of customer relations, who will focus on SNF site, staff, and resident engagement in the program; (3) a social worker, who will focus on the development and delivery of education in and tools for advanced care planning; (4) a nurse practitioner of psychiatry, who will provide direct support to residents with behavioral health needs; (4) five APPs, who will provide support for telephone and video consults; and (6) a registered nurse, who will assist with telephone and video consults.

In addition to these program design changes, Avera continued to refine the risk-stratification approach for identifying newly admitted SNF residents who are at high risk for or vulnerable to ED visits or hospital readmission. This is the centerpiece of the transitional care component of the program. The addition of the 15 SNFs to the program may facilitate this refinement because the eLTC interdisciplinary team that is conducting the risk-stratification of residents in the transitional care component will have more patient data to work with to fine-tune the risk-stratification algorithm. During the second program year, the interdisciplinary team began working with Avera's clinical intelligence team to investigate how to ensure that they are

identifying all of the newly admitted residents who need extra attention. The two teams continue to test the addition of new variables to the algorithm and make adjustments. Once the risk-stratification approach is established, program leaders intend to create a systematic process to risk-stratify residents across SNFs.

2. Implementation processes

Program staff cited multiple strategies that facilitated the implementation of the eLTC program. They include Avera's tri-level strategy to increase eLTC service use, new training supports to address SNF administrator and nurse turnover as well as knowledge gaps among SNF staff, and the deployment of the software program eLITE to facilitate the exchange of data between Avera and the SNFs and to improve the awardee's reporting on self-monitoring measures.

During Year 2, Avera's strategy for increasing the utilization of eLTC services was to strengthen engagement in the program at three levels: (1) PCPs providing care to SNF residents, (2) SNF nursing staff, and (3) SNF sites. To encourage PCPs to more fully buy into and get involved in eLTC, program leaders began to meet with them face to face, and more frequently, to listen to their concerns and assure them that they have a say in the eLTC services provided to the residents they care for. The program leaders know from experience that PCPs are usually better able to understand and more willing to buy into the program after they witness its benefits firsthand, so the leaders also encouraged PCPs to try eLTC services at least once. When launching the eLTC program at the 15 new SNFs in Year 2, Avera also sought to improve buy-in by applying a lesson it learned during the first program year. The awardee informed the PCPs of the residents at the new SNF sites about eLTC and its benefits *before* the SNFs formally started participating in the program. Avera also worked with SNF leaders to determine the best way to introduce the program to the PCPs. For example, leaders at some SNFs advised Avera to conduct formal presentations for the PCPs, whereas other SNF leaders suggested that Avera have informal conversations with the PCPs about the program. As of June 2016, program leaders reported that both strategies were effective in all but a few SNFs.

To boost the SNF nursing staff's engagement and buy-in, program leaders visited the SNFs and provided the frontline nursing staff with additional training in, and support for using, the mobile cart. Avera found that—with time, encouragement, and practice—the nursing staff overcame their fears related to using or damaging the mobile cart and became more open to, and confident in, using the technology.

At the site level, Avera used two strategies to build SNF engagement and buy-in: it established a new process for reviewing transfers to EDs and hospitals, and it included a site-by-site comparison of unplanned transfers in its monthly reports. Program leaders reported that the main metric used to monitor SNF engagement with the program is the percent of transfers to the ED and hospital that eLTC providers are involved in. Program leaders see the transfer review process as crucial to increasing the use of eLTC consults, and thus reducing unnecessary ED and hospital transfers. While Avera aims to be involved in half of all such transfers (recognizing that a higher rate is unrealistic given some resident emergencies require immediate transfer), eLTC providers were involved in 30 percent of transfers in May 2016—an all-time high for the program.

In the new review process, program leaders schedule a conference call with SNF staff to discuss each unplanned transfer to an ED or hospital in which eLTC providers were not consulted. During these calls, program leaders coach SNF staff on how to identify changes in the residents' conditions early on so that care is more likely to be delivered at the SNF rather than at the ED or hospital. During the conference calls, program leaders also train the staff in how to identify situations that are truly emergent. Although some SNF staff have resisted the addition of another process, program leaders are communicating with SNFs to educate them on the importance of the transfer review process and of using eLTC consults before transferring residents.

The site-by-site comparison, which program leaders began to include in the eLTC monthly reports in Year 2, consists of graphs that rank the SNFs' rate of unplanned transfers relative to one another. Although all SNFs can see all of the rates, they can identify only their own rate. Program leaders expect the comparison to spark friendly competition between the SNFs and thereby get them more involved in the program by motivating them to consult with eLTC providers before they transfer residents to an ED or a hospital.

Avera developed additional training supports during the second program year to address turnover among SNF administrators and nurses, as well as gaps in knowledge among SNF staff. To address turnover and the loss of SNF leaders who promote and use the eLTC program, Avera gives new administrators an orientation to the program as soon as they move into their role. The awardee also provides a training video and support materials for new nursing staff.[5] During 2015, the turnover rate at SNF sites ranged from 7 to 105 percent. Program leaders also began to meet regularly with SNF leaders to stay up to date on and collectively remedy issues arising from turnover. In addition, some SNFs built eLTC training into their own orientations for newly hired nursing staff.

> "We have turnover, but eLTC has just been incorporated into the orientation process. . . . eLTC is very good about being willing to do additional training with them. I don't think turnover is too much of a factor. . . . I think the key factor in our building is that I . . . make sure that everybody new who comes on knows that there's an additional resource for them. They can be the only human in the building, but they're still not alone because they still have eLTC."
>
> *— SNF nurse*

Avera also developed additional training to address knowledge gaps among SNF nurses—particularly in advanced care planning—that prohibit the delivery of high quality care to residents. Although program leaders always intended that the eLTC program would provide education on advanced care planning, they found that SNFs were doing less advanced care planning than they had anticipated. In response, Avera used two strategies to provide this training and to encourage advance care planning. First, the awardee added a social worker, who became part of the eLTC team of providers and led training sessions every other month for the SNF staff on advanced care planning topics such as ethics and legal implications. During the other months, the social worker held group discussions on end-of-life care for staff from several SNFs, grouped by long-term care provider organization. Second, Avera invited SNF staff to call the eLTC central office for the social worker's assistance in talking with residents and families about end-of-life care. In addition, the social worker conducted tele-health visits on advanced

[5] The video and other training materials will be deployed when Avera receives approval from CMS to do so.

care planning with residents and families if SNF staff felt that they needed support. However, program leaders said that the social worker tele-health visits were intended to educate and model for nursing staff how to have discussions on advanced care planning with residents and families, not to provide the service on behalf of the nursing staff. Program leaders believe that, with training and education, SNF staff will gain the skills and confidence to manage these encounters independently and provide higher quality care to residents.

Most program staff reported that they were interested in learning more about advanced care planning because of its current emphasis in health care in general or because the eLTC program's work on this topic builds off of the work they were doing or planning to do. However, a few staff members were not enthusiastic about this new focus. One program leader attributed this attitude to the emotional difficulty of talking about advanced care planning. One SNF nurse said that the addition of advanced care planning work on top of the monthly calls, educational events, and paperwork made the program difficult to participate in because of the heavy workload.

Avera also began to deploy a software program called eLITE,[6] which is expected to facilitate program implementation in two ways. First, it will permit eLTC providers and SNFs to exchange data directly through its interfacing components. Second, it will serve as a repository of program information, allowing Avera to improve its reporting on self-monitoring measures. Although the full deployment of eLITE has been delayed, Avera has trained clinical staff on the software and began user acceptance testing.

Program leaders reported that eLITE will facilitate the exchange of data between eLTC providers and the SNFs through its interfacing components that allow patient information to be transmitted directly from SNFs to the eLTC central office. Similarly, eLITE will allow eLTC providers to electronically share with SNFs the information they document after each patient encounter, thus eliminating the need for sending patient information via fax or email. The awardee began to work with EMR vendors to integrate eLITE into two types of SNF EMRs. Avera expects to complete the integration in 2016.

As a repository of program information, eLITE will allow Avera to analyze program data in detail, making it easier to report self-monitoring measures that the awardee uses to examine program performance and to assess program effectiveness. For example, when eLITE is fully deployed, Avera will be able to pull from it information on how many tele-health encounters were for urgent care, transitional care review, or ePlan follow-up. Before eLITE was deployed, Avera could only pull information on how many tele-health encounters were initiated by the SNF and how many were initiated by eLTC providers; there was no information on the type of encounter.

Avera intends to expand eLITE functionalities. For example, Avera hopes to have enough data on long-stay residents to risk-stratify them. At the time of our site visit, Avera did not have enough data to risk-stratify long-stay residents until they were seen by eLTC providers for an urgent care tele-health visit. Avera also hopes that eLITE will automatically notify eLTC

[6] Avera developed eLITE in collaboration with an external software vendor.

providers when a SNF admits or discharges a resident; the goal here is to streamline the transitional care component of the program.

In addition to using eLITE for data exchange and more detailed analyses in data reporting, Avera started meeting with its clinical and business intelligence teams to analyze data from CMS claims and the Minimum Data Set. The purpose of the analysis is to report on eight measures in the awardee's Year 2 self-monitoring measurement plan that it had not yet reported on during the cooperative agreement. (Avera had reported on 10 of 18 measures in its self-monitoring measurement plan at the time of our site visit). Although the teams' limited resources led to delays in this work, Avera started meeting with the teams on a biweekly basis to try to mitigate further delays in the measure reporting. The awardee also plans to report on newly developed self-monitoring measures. These measures relate to customer satisfaction and to program quality, operations, and financing. Avera expects to propose adding these new measures to its CMS project officer soon.

3. Organizational and external context

The organizational and external context in which eLTC operates presented as many challenges to implementation as it did facilitators of implementation. Challenges to implementation were: (1) SNF credentialing requirements and bylaws and (2) lack of buy-in among some PCPs employed at hospitals competing with Avera. Facilitators to implementation were: (1) readmissions penalties and other value-based payment policies for hospitals and (2) that Avera is no longer seeing the trend in which SNFs use an on-site mid-level provider to address the types of issues that eLTC is designed to address.

SNF credentialing requirements and bylaws continue to be a challenge for Avera because they can prohibit eLTC nurse practitioners and physician assistants from providing medical care to SNF residents. For five of the 45 SNFs participating in the program, eLTC providers are required to be credentialed as medical staff at the hospital to which the SNF is attached before they can treat SNF residents. Because Avera faced this challenge while implementing its other lines of telemedicine services, it has an established credentialing department to handle this issue. Avera is working with the department to get all eLTC providers appropriately credentialed.

Program leaders also reported that one of these five SNFs has bylaws that limit PCPs to overseeing only two mid-level providers at one time, thereby preventing Avera—with six eLTC providers—from providing medical care to SNF residents. Avera is working with this SNF to revise the bylaws so that different supervision rules apply to eLTC providers.

Other features of the external context promote program implementation. Readmissions penalties and other value-based payment policies for hospitals continue to facilitate the adoption of the program. As reported in the first program narrative, hospitals with excess readmissions face penalties and payment reductions under Medicare's Hospital Readmissions and Reduction Program. Hospitals have therefore encouraged SNFs to use programs like the eLTC to reduce readmissions. In addition, Avera reported that a recently released Medicare-proposed rule for SNFs called for physician face-to-face visits to be required before any unplanned transfer. Program leaders reported that if Medicare counts tele-health visits as face-to-face visits, then the potential new rule would prompt SNFs to participate in the eLTC program.

Avera is no longer seeing the trend in which SNFs use an on-site mid-level provider during regular business hours to address the types of issues that eLTC is designed to address. In Year 1, Avera anticipated that the use of these mid-level providers would deter SNF staff from engaging with the program, so program leaders worked with SNF administrators to find a way to use mid-level providers and eLTC providers. They agreed to encourage SNF staff to reach out to the on-site provider for issues related to the residents' during the day and to eLTC staff at night and on weekends. However, in Year 2, Avera reported that the use of on-site mid-level providers decreased—likely because SNF budgets became tighter.

Buy-in of the eLTC program continued to be limited among some PCPs employed at hospitals that compete with Avera for patients, although it varied from one physician to the next. Some PCPs understand that the program is intended to be a collaboration between PCPs and eLTC providers, whereas others are worried that they may lose patients who decide to transition to Avera PCPs.

C. Development of the payment model

Avera made steady progress in developing and implementing its payment model by exploring models based on shared savings, retail subscription, and CPT code reimbursement. Avera also continued to award incentive payments to SNFs for their active participation in the program.

Avera continued to explore payment models for the eLTC program. In its HCIA R2 application, the awardee indicated that it preferred a combination of a shared savings model and a retail subscription model. However, in Year 2, Avera learned that many other value-based payment arrangements already affect its target population and that if the eLTC program joined a shared savings plan, there would be complications related to who manages the plan (for example, the PCPs, the SNFs, and so on). Therefore, Avera abandoned the idea of a shared savings payment model.

Avera continued to explore the possibility of a retail subscription model. Program leaders designed the eLTC program so that even though participating SNFs receive incentive payments from Avera, they simultaneously pay a subscription fee to the awardee. The SNFs can decide whether they pay the fee with funds from their incentive payment or with different funds. Program leaders structured the program in this way so that SNFs, while participating in the eLTC program for free, would become accustomed to paying a subscription fee for the program. This would make it easier for Avera to convince the SNFs to pay for the program themselves after the cooperative agreement ends. Program leaders reported that it is too early to determine how many SNFs are seriously interested in continuing to pay the subscription fee. Avera began testing the retail subscription model with three SNFs that are not funded through HCIA R2.

> "Before we started [the program], the incentive payments were absolutely critical. Now that I know what the program can do, [it's] less critical. . . . When you're getting into this, you're going, 'What's in it for me? I don't want this to cost me more' . . . After we've used the program, then it becomes something that I'm not sure that we could do without now."
>
> *— SNF administrator*

In addition to the retail subscription model, Avera began to explore reimbursement through existing chronic care management and transitional care management CPT codes. Avera reported that the eLTC clinical workflow is broadly represented in the primary billing criteria for these codes, but that revisions to the billing rules for place of service and provider type are necessary to allow eLTC program service reimbursement. The awardee began reaching out to stakeholders that, like Medicare Advantage, develop payment models or revise CPT code regulations to discuss potential regulatory changes that would enable reimbursement through existing CPT code methodology and the development of related pay-for-performance measures.

Avera continued to award incentive payments to SNFs for their active participation in the program. As reported in the first program narrative, SNF administrators and staff appreciate the incentive payments. Program staff reported that they believe that the incentive payment criteria and amounts are fair. Avera encourages the SNFs to use the incentive payments to support program operations, although not all SNFs do so. Some SNF administrators and staff reported that they use the incentive payments to increase their network's bandwidth in order to support tele-health services. Another used the funds to install an air conditioning unit in the nurses' station to reward them for using the program and to encourage them to continue to do so. Yet another used the funds to upgrade medical equipment that is not related to the program.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our preliminary findings on the baseline characteristics of the treatment group, which we identified from the administrative data. This represents a different approach from our previous reports, in which we relied on the awardee's enrollment finder file.

A. Baseline characteristics of the treatment group

In the previous annual report, we used facility admission and discharge data from Avera to identify the treatment group. For this annual report, we used administrative data to identify the treatment group beneficiaries because to estimate the impact of the intervention we must use only administrative data to identify the comparison group beneficiaries in the pre-intervention and post-intervention periods. When we applied the same process and criteria to identify the treatment group beneficiaries, we found significantly more treatment beneficiaries than we did when using the awardee's enrollment finder file. This discrepancy led us to use the MDS data to identify treatment group beneficiaries. If we were to use a treatment group sample from the awardee's finder file and a comparison group sample from the MDS data, the differences in the identification process might introduce selection bias to the impact estimates.

As with previous reports, all Medicare beneficiaries who were residing in a participating facility at the start of Avera's eLTC program or who became residents of participating facilities after the start of the program are considered to be eligible for the treatment population. Facilities began participating in the program between November 2014 and October 2015. To identify the treatment group by using the MDS, we applied the following criteria: (1) the individual had to reside in an Avera facility during the intervention period and (2) the individual had to have a non-missing case-mix index (CMI) value, which the MDS uses to measure relative resource utilization. We were able to attribute treatment beneficiaries based on their facility because the intervention was implemented at the facility level; thus, all residents at a participating facility could potentially benefit from the program. Consistent with previous reports, a participant's enrollment date depends upon his or her status as an existing or new resident in a participating SNF on or after the program start date. The program enrollment date for an existing resident is the date on which the program began at his or her facility; the enrollment date for a new resident is the first day on which he or she became a resident in a participating facility. We have not used Medicaid data to identify potential treatment group members because these data are currently available only for the first few months of the program period.[7]

We applied specific eligibility criteria for Medicare beneficiaries in order to present baseline characteristics and health care utilization outcomes in this report. First, we included in the treatment group beneficiaries who were residents of participating facilities during the program period if they were enrolled in Medicare FFS (both Parts A and B), with Medicare as the primary payer on their program enrollment date. Second, beneficiaries would have to meet all evaluation criteria for a period of at least 90 days during the baseline year (the 365 days immediately before

[7] We can confidently identify Medicaid-enrolled, long-stay residents in facilities located in South Dakota and Iowa (25 of 30 facilities) by using Medicaid Alpha-MAX data. However, because of lags in the Alpha-MAX data, we will be less likely to identify long-stay residents in Minnesota and Nebraska (5 of 30 facilities).

their enrollment date). Third, beneficiaries had to be residents of a participating facility on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. Finally, we excluded from the treatment group any resident whose admission date was before January 1, 1980, because the four cases with earlier admission dates appeared to have erroneous admission dates.

As of May 31, 2016, we identified 4,624 Medicare beneficiaries in the MDS data who met the eligibility criteria for the Avera eLTC program. We refer to these beneficiaries as the treatment group for the evaluation. This is a larger sample than the 3,629 Medicare enrollees whom we identified from earlier finder files. Further, 3,480 (96 percent) of the 3,629 Medicare enrollees were also included in the MDS-based treatment sample, suggesting that the use of administrative data captured nearly all participants in the awardee's finder file as well as additional participants who should have been attributed to the treatment facilities. Enrollees who are not in the treatment group are those who were not attributed to the treatment facilities during the program period according to the MDS, or who were attributed but had a missing CMI. We excluded these enrollees from the treatment group because we would not be able to replicate this identification process for comparison group members.

The baseline demographic and health status characteristics in this report include information for 4,624 Medicare beneficiaries who met the program eligibility criteria (Table 2). Given the program's focus on long-term care, Avera program participants have substantially poorer health and greater care needs than most Medicare FFS beneficiaries. Most participants are age 85 or older (46 percent) or 75 to 85 years old (30 percent). Sixteen percent of participants are age 65 to 74 and 8 percent are younger than 65. Most participants are female (66 percent) and white (94 percent). For the majority of participants (80 percent), the original reason for Medicare eligibility was age (65 or older). For the remaining participants, the original reason for Medicare eligibility was a disability (19 percent) or end-stage renal disease (ESRD) (fewer than 1 percent). Twenty-three percent of participants are dually eligible for Medicare and Medicaid, although in some cases Medicaid benefits may be restricted to the payment of co-insurance and deductibles. The average hierarchical condition categories (HCC) risk score of participants (2.49) is nearly 2.5 times higher than the average for Medicare FFS beneficiaries nationally (1.0). More than three-quarters of the participants have HCC risk scores higher than the national average.

Participants also had high rates of service use and Medicare expenditures in the year before enrollment. In Table 3, we report baseline utilization and expenditure data for a common set of measures. Avera expects to reduce hospitalizations by 16 percent and emergency department (ED) visits by 28 percent, compared with the baseline year rates for such admissions and ED visits among long-term care residents. If reductions in hospitalization rates and ED visits are realized, then the program should bring about a similar decline in Medicare expenditures.

We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $2,440—roughly 3.1 times the U.S. average Medicare expenditure per enrollee in 2014. Average PBPM Medicare payments for inpatient ($1,059); SNF ($459); and outpatient ($393) services were the largest drivers of total cost of care. The mean Medicare PBPM expenditures were similar to that of the Avera enrollee sample from the finder file delivered in February 2016 ($2,472), as were expenditures in most service

categories. However, Medicare expenditures in the baseline year were notably higher than the $2,036 and $2,187 PBPM reported in earlier finder files, as were expenditures in inpatient, SNF, and outpatient services. This suggests that, compared to beneficiaries who enrolled up to the end of the sixth program quarter (February 29, 2016), beneficiaries who enrolled in the seventh program quarter (March 2016 to May 2016), as identified in the MDS, had higher expenditures and utilization during their baseline year. This change could be driven by a cohort of sicker patients recently admitted to Avera facilities.

The rates of acute care hospitalizations and ED visits were moderate for this institutionalized population of Medicare beneficiaries. The rate of acute care hospitalizations was 1,107 per 1,000 Medicare FFS participants per year during the baseline year—more than four times higher than the U.S. average of 274 per 1,000 in 2014.[8] The rate of ED visits not leading to hospitalization was 799 per 1,000 participants per year in the baseline year, while the rate of ambulatory observation stays was 175 per 1,000 beneficiaries per year. These estimates translate to roughly 5,119 hospital admissions; 3,695 ED visits; and 809 observation bed stays in the baseline year for Medicare beneficiaries participating in the Avera eLTC program, suggesting opportunities to reduce avoidable hospitalizations and ED visits through enhanced care coordination. The rate of primary care visits was 10,045 per 1,000 Medicare FFS participants per year, while the rate of specialty services was 11,202 per 1,000 participants per year. The likelihood of a 30-day readmission was close to the national average, at 18 percent per discharge and 8 percent per beneficiary. Utilization and expenditures for nearly all services were considerably higher in the baseline fourth quarter compared with the first through third quarters. This pattern is consistent with the expectation that many new residents likely had costly acute care services immediately prior to the nursing home admission that triggered their program enrollment. As with the expenditure measures, the mean utilization measures of the treatment group beneficiaries were similar but somewhat lower than the means of the Avera enrollee sample from the February 2016 finder file. Furthermore, these baseline utilization measures were higher than those observed in the previous two reports.

[8] The PBPM expenditure and hospitalization and ED visit rates were drawn from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the treatment group of the awardee's program through May 31, 2016

	All participants (N = 4,624)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	358	8
65 to 74	736	16
75 to 84	1,389	30
85 and older	2,141	46
Gender		
Female	3,030	66
Male	1,594	34
Race		
White	4,336	94
Black	6	0.13
American Indian, Alaska Native, Asian/Pacific Island American, or other	268	6
Hispanic	4	0.09
Original reason for Medicare eligibility		
Old age and survivor's insurance	3,698	80
Disability insurance benefits	882	19
ESRD[a]	44	0.95
Hospice[b]	99	2
Medicare/Medicaid dual status, percentage dual[b]	1,051	23
HCC score[c]		Statistic
Mean		2.49
25th percentile		1.34
Median		2.02
75th percentile		3.22

Source: Mathematica analysis of information from the Minimum Data Set and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 12 months before each beneficiary's enrollment date. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the treatment group of the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	4,624	4,575	4,595	4,621	4,624
Average Medicare expenditures PBPM[a]					
Total	2,440 (46)	1,675 (74)	1,900 (61)	1,805 (69)	4,361 (102)
Acute inpatient	1,059 (27)	567 (32)	639 (35)	612 (42)	2,404 (69)
Inpatient other[b]	99 (10)	52 (10)	59 (11)	69 (18)	213 (24)
Outpatient[c]	393 (10)	342 (12)	378 (13)	364 (13)	487 (13)
Physician services	301 (6)	222 (7)	243 (7)	234 (7)	505 (11)
Home health	58 (3)	57 (4)	55 (4)	63 (5)	55 (4)
Skilled nursing facility	459 (14)	378 (53)	458 (25)	387 (24)	610 (32)
Hospice	38 (4)	24 (5)	33 (5)	41 (6)	54 (6)
Durable medical equipment	33 (2)	32 (2)	35 (3)	33 (2)	33 (2)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,107 (19)	686 (29)	717 (28)	685 (34)	2,325 (44)
Outpatient ED visits	799 (22)	703 (32)	723 (33)	664 (30)	1,104 (39)
Observation stays	175 (7)	127 (11)	145 (12)	122 (11)	303 (17)
Primary care visits in any setting	10,045 (134)	7,958 (173)	8,504 (176)	8,377 (180)	15,292 (264)
Primary care visits in ambulatory settings	6,066 (79)	5,639 (101)	5,944 (103)	5,871 (101)	6,800 (114)
Specialist visits in any setting	11,202 (215)	9,295 (260)	9,294 (236)	9,213 (256)	16,938 (422)
Specialist visits in ambulatory settings	6,393 (128)	6,241 (159)	6,224 (150)	6,312 (171)	6,779 (147)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	66 (1)	14 (1)	15 (1)	14 (1)	46 (1)
Percentage with an outpatient ED visit[e]	42 (1)	13 (1)	13 (1)	13 (< 0.5)	20 (1)
Percentage with an observation stay[f]	15 (1)	3 (< 0.5)	3 (< 0.5)	3 (< 0.5)	7 (< 0.5)
Percentage with a 30-day readmission among all discharges	18 (1)	17 (1)	16 (1)	17 (1)	20 (1)
Percentage of participants with a readmission among all participants	8 (< 0.5)	2 (< 0.5)	2 (< 0.5)	2 (< 0.5)	3 (< 0.5)

Source: Mathematica analysis of information from the Minimum Data Set and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Avera

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	5,444
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,220
Likelihood of all-cause hospitalizations	763
MDE sample size requirement to detect 20% effect	
Total expenditures	305
Likelihood of all-cause hospitalizations	191
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We expect to construct two comparison groups from residents of matched nursing facilities in Iowa, South Dakota, and Minnesota—one for newly admitted SNF patients and one for long-term facility residents. We have assessed the quality of the treatment-comparison match for SNF patients with respect to HCC score, prior-year Medicare spending, and prior rate of hospital admission and found it to be acceptable. While sample sizes should be sufficient to detect effects of plausible size, we cannot be sure that the intervention remains in force at all facilities due to the expected sale of those in the Golden Living chain.

V. NEXT STEPS

A. Implementation evaluation

As Avera enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis include exploring ways to achieve a more balanced Medicare sample, such as reweighting with individual propensity score. Once we are confident that we have matched samples of treatment and comparison beneficiaries, we will produce initial impact estimates for the first one to two quarters of program operations, separately for the long-stay and short-stay patients. We will do so by constructing awardee-specific measures, including (1) the rates of outpatient follow-up within 7 days and within 30 days after a hospital discharge, (2) utilization rates and expenditures during a SNF stay, and (3) outcomes within the 30 days after a SNF discharge. Depending upon data availability, we will also identify Medicaid beneficiaries who reside in treatment and comparison facilities and attribute these beneficiaries to one group or the other, comparing baseline characteristics across the two groups and determining how well the groups match. We plan to report soon on the main outcome measures during the early program months, including total Medicare expenditures PBPM, ED visit rate, and 30-day unplanned readmission rate.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff at SNFs.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include SNF administrators, directors of nursing services, assistant directors of nursing services, and directors of resident care. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services, either directly or indirectly, from the eLTC program.** The survey will focus on the participants' experiences in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.6.

BOSTON MEDICAL CENTER

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MATHEMATICA Policy Research

REPORT

APPENDIX B.6

HCIA Round Two Evaluation: Boston Medical Center

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Collaborative Consultative Care Coordination (4C) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Boston Medical Center's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Boston Medical Center made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Boston Medical Center addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its implementation partner to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Boston Medical Center's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the 4C program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Boston Medical Center and its partner, Baystate Medical Center, are using HCIA R2 funding to implement the 4C program (key program characteristics are noted in Table 1). Both Boston Medical Center and Baystate are acute care, nonprofit, academic medical centers located in urban communities in Massachusetts. The 4C program, which was launched in December 2014, provides care coordination for children with medical complexity (CMC) and their families. The program defines CMCs as children who are diagnosed with at least one chronic, complex medical condition in any of nine categories[2] who had high service use in the year before enrollment or who were considered by the 4C staff to be at risk for high service use. Children can enroll in the 4C program regardless of insurance status; approximately 42 percent are enrolled in Medicaid.

The care coordination that Boston Medical Center and Baystate offer as part of the 4C program includes the following services: (1) an initial multidisciplinary assessment at enrollment; (2) development of a comprehensive care plan; (3) referrals to social, educational, behavioral, and medical services; and (4) ongoing collaborative care coordination between the patient's primary care physician (PCP), specialists, and other nonmedical services. The patients return to the clinic for a one-month follow-up, and every six months thereafter (and for ad hoc appointments as necessary). The 4C staff are organized into teams (two per implementing site) composed of a nurse care coordinator, a social worker, a family navigator, a behavioral health worker, a child psychiatrist (or child psychologist), a nutritionist, and a complex care pediatrician. Each team is led by the complex care pediatrician, who is not the participant's PCP. A nurse care coordinator serves as the clinical hub. The teams help CMCs and their families meet the goals set forth in their comprehensive care plans by making necessary referrals to and appointments with providers and by helping the family access needed community supports and resources. The 4C program staff use a secure, cloud-based, Internet portal (ACT.md) to make the care plan available to families, PCPs, and other providers involved in the child's care.

The awardee aims to enroll 450 children by the end of Year 3; it recruits them primarily through referrals from providers and direct recruitment during hospital stays. The awardee hypothesizes that improving care coordination for CMCs and their families will (1) ensure that CMCs and their PCPs have access to comprehensive diagnostic services, multidisciplinary care planning, and care coordination; (2) improve the functional status of CMCs enrolled in the program, as well as lower stress and alleviate depression in parents and other caregivers; and (3) achieve an approximately 13 percent reduction from baseline in the total cost of care (per beneficiary per year).

Boston Medical Center's intent is that the payment model developed by the end of the three-year cooperative agreement will consist of a monthly collaborative care management and consultation fee.

[2] The categories are (1) neuromuscular, (2) respiratory, (3) cardiovascular, (4) renal, (5) hematologic, (6) immunologic, (7) metabolic, (8) autism spectrum, and (9) congenital defect.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Boston Medical Center during the first year of its cooperative agreement.

- To meet enrollment goals, program staff used multiple approaches to raise awareness of the program's services among providers and families in the Baystate and Boston Medical Center communities. As a result, they developed partnerships with numerous providers who, because they perceived benefits in the program, referred patients and their families.
- To meet the myriad needs of participants and their families, program leaders as well as frontline and administrative staff emphasized the importance of being part of a team of self-motivated individuals with professional expertise and a commitment to the population served by the program. In addition, constant communication among leaders and frontline and administrative staff supported the teamwork necessary to meet the needs of participants and their families.
- Program staff believed that there were a number of benefits to maintaining participants' care plans in a secure, cloud-based, Internet portal known as ACT.md.

We also identified several initial challenges in implementing the program and Boston Medical Center's strategies for addressing them.

- The initial, two-hour, multidisciplinary assessment appointments did not give program staff enough time to gather the necessary information from participants and families. Strategies to overcome this included (1) scheduling meetings with families prior to intake and (2) having staff meet with participants and families in pairs—instead of as an entire care team—during the intake assessment appointment.
- Despite the comprehensive information in a participant's care plan, families and providers outside the program were generally not accessing it. In addition, the care plan platform was not integrated with electronic medical records (EMRs). Program staff worked with the vendor to customize and simplify the care plan to make it more user-friendly.

Finally, we identified early lessons learned by Boston Medical Center in implementing its program.

- Program leaders and frontline and administrative staff believed that there was much to be gained from remaining flexible during program implementation and from fine-tuning their roles and the program as needed.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Boston Medical Center made progress in the following areas:

- Boston Medical Center reached 59 percent of its three-year projected enrollment target.
- Both locations (Baystate and Boston Medical Center) now have two fully staffed multidisciplinary clinical teams. The 4C multidisciplinary teams continued to work with

CMCs and their families to develop comprehensive care plans and provide care coordination support to meet the goals set forth in the care plans. As in the first program year, program leaders and staff attributed much of the 4C program's success to the staff's dedication to working with families.

- Although the awardee made progress in obtaining baseline cost and utilization data for some enrolled participants from some participating payers, it had not received enough data to use it meaningfully in developing a payment model.

Over the past year, Boston Medical Center also made some changes to its program.

- The awardee began offering services in a second clinic site at the Baystate location.
- The awardee began using secure messaging to communicate and share information with providers and families.
- Boston Medical Center decided not to integrate ACT.md with providers' EMRs.

Below we note the key challenges that Boston Medical Center has worked to address in the second year of its cooperative agreement.

- As caseloads grew, program leaders reported difficulty in providing the same scope of services as in the first program year. The awardee is refining service delivery to be more efficient and using communication tools and processes to ensure the teamwork that is necessary to meet the needs of the participants and their families.
- Because the 4C program faces competition for patients in the Boston metropolitan area, which is saturated with other pediatric providers who offer services for CMCs, the Boston Medical Center has enrolled a higher percentage of children with psychosocial issues than with more typical medical complexity. This impeded the staff's ability to serve families. Staff remained as responsive as possible to these unexpected needs by being flexible; collaborating with team members when they needed assistance; and making referrals to social service agencies and case workers, who were better suited to handle the families' concerns.
- A lack of timely responses from PCPs made it challenging for the 4C staff to coordinate CMCs' care. To overcome this challenge, 4C staff started getting advanced authorization from PCPs and permission to make referrals on their own. They also began using the secure messaging system to make it easier for PCPs to respond in a timely manner.
- The limited engagement of some families made it difficult for staff to provide ongoing coordination support and help them achieve the goals set forth in the care plans.

As Boston Medical Center enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee indicated that it might be difficult to determine a monthly care coordination and consultant fee (its proposed payment model) because it has yet to receive sufficient and timely cost and utilization data for enrolled participants from payers. However, awardee leaders reported gaining some traction and receptivity among payers in response to the preliminary analyses that were conducted with the limited data.

- The awardee is unsure how the decision of MassHealth—the state's Medicaid and CHIP program—to transition from fee-for-service care into a regional accountable care organization (ACO) model will affect the 4C program. Both the Baystate and Boston Medical Center health systems submitted proposals to serve as regional ACOs. The 4C program may benefit from long-term sustainability opportunities if either site were identified as a MassHealth ACO, but it is unclear how the decision will affect the program's payment model in the short-term.

Table 1. Boston Medical Center: 4C program characteristics at a glance

Program characteristic	Description
Purpose	The 4C program from Boston Medical Center (BMC) helps CMCs and their families to coordinate social, behavioral, and medical services.
Components	• Care coordination • Health information technology
Target population	To be eligible for 4C services, CMCs must have empirical evidence of high utilization in the calendar year prior to referral—for example, 10 or more combined ED or clinic visits, 10 or more days in the hospital, or at risk of high utilization: • Receiving referrals to multiple specialists (for example, neurology, pulmonology, endocrinology, and so on) • Having conditions that affect multiple body systems (for example, head, lungs and glands) • Experiencing an intensive care unit admission that causes a significant change in a child's health and need of services • Having any complicating psychosocial and economic factors that are (or are at risk of) adversely affecting health outcomes, including children whose caregivers have significant stressors
Theory of change/theory of action	BMC hypothesizes that improving care coordination for CMCs will lead to improved child functional status and caregiver experience as well as decreased health care costs.
Payment model	New fee-for-service (FFS) payment, bundled or episode payment, capitated payment for care management/coordination services
Award amount	$6,128,059
Launch date[a]	December 12, 2014
Setting	Acute care, nonprofit, academic medical centers
Market area	Urban
Market location	MA (Boston and Springfield)
Outcomes	• Improved care coordination • Improved child functional status • Improved caregiver experience • Lower costs of care

[a]After the initial planning period, the awardee's program began to operate as of this date.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Boston Medical Center in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 through June 24, 2016. For the analyses of Boston Medical Center's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- 4C project director
- 4C project manager
- Two complex care pediatricians (one per implementing site)
- Three nurse care coordinators (one from Boston Medical Center and two from Baystate)

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

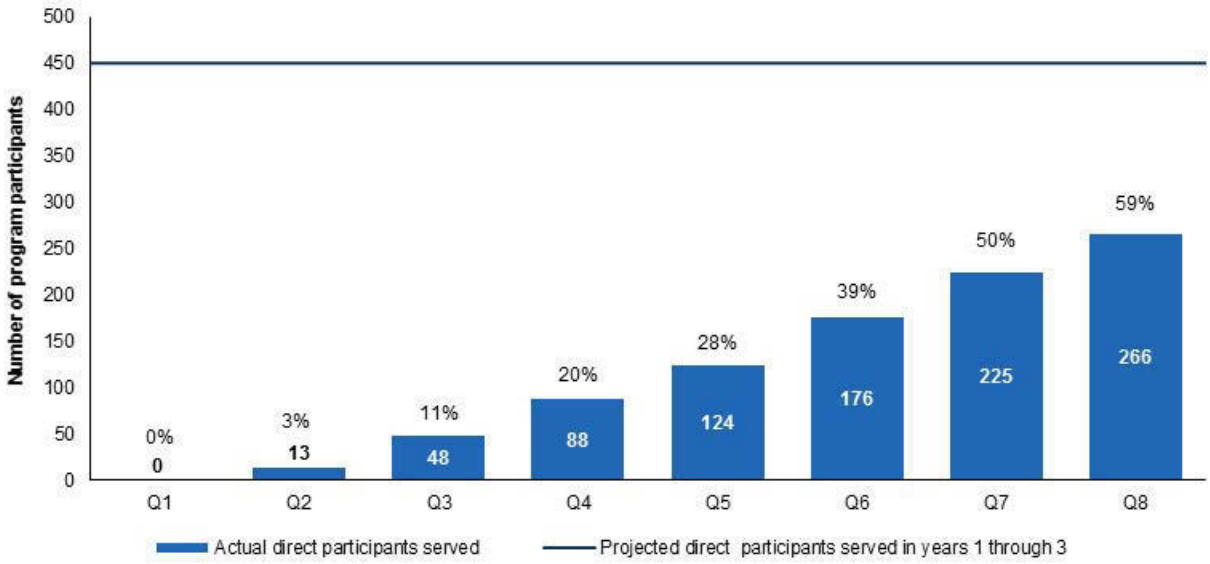
The rest of this chapter presents a synthesis of our findings from the implementation evaluation, on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the awardee's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Boston Medical Center reported to the implementation and monitoring contractor that it directly served 266 participants from December 2014 (the launch of its program) through August 2016, which represents about 59 percent of its 450 projected direct participants (Figure 1). Approximately two-thirds of the participants (181 of 266) were enrolled in Medicaid fee-for-service, Medicaid managed care, or CHIP managed care.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. BMC does not have indirect program participants.

Although the awardee is making progress toward its three-year enrollment goal, enrollment rates differ for the Baystate and Boston Medical Center sites. Interviewee respondents described different factors as influencing, positively or negatively, enrollment in each location.

> "What is happening now is that the doctors whose patients are being cared for by us love [the 4C program]. We are getting second and third referrals from those practices."
>
> — *Complex care pediatrician*

Baystate is meeting enrollment targets, which staff attributed to its location and growing reputation in the community as a valuable program. Baystate is the only pediatric hospital in Springfield, Massachusetts, and it offers services not otherwise available to CMCs in the area. Interview respondents also reported that growing community awareness about the program from advocates and providers has largely overcome earlier PCP reluctance to refer patients. Baystate received a larger number of referrals from PCPs in the second program year, compared to the first program year. In addition, staff

cited the reputation in the community of one of the Baystate complex care pediatricians as a facilitator to enrollment. Baystate also began providing services at an additional clinic site in the second program year; 4C staff indicated that this aided enrollment because some families found the new location more convenient than traveling to Springfield. Baystate reported conducting more home visits prior to intake, which facilitated enrollment through more face-to-face patient engagement and cut down on time during the intake appointment.

Enrollment has been slower and more challenging at Boston Medical Center. In contrast to Baystate, Boston Medical Center faced competition for patients in the Boston metropolitan area, which has many other pediatric providers who offer services for CMCs. As a result, Boston Medical Center continued to enroll a higher proportion of children with complex behavioral health issues compared with Baystate because there are fewer programs available to meet complex mental health needs. In addition, Boston Medical Center expected substantial payer support in identifying and referring children with high service utilization to the program, but payer participation has been lower than anticipated (although, it slowly increased in the second year). Boston Medical Center program staff and leaders have continued to invest in on-the-ground outreach and recruitment efforts (including presentations to schools, community centers, and within the hospital) to overcome enrollment challenges. However, staff had less time to invest in these efforts in the second program year because of the growing patient panel. The 4C clinic is housed within Boson Medical Center, which is a safety net hospital located in a community that some parents consider unsafe. Program staff reported that this further limited parents' interest in enrolling and attending appointments there. Boston Medical Center staff reported a more diverse cultural makeup for patients in Boston than at Baystate; staff have faced cultural barriers to doing home visits prior to intake, which has been a major facilitator of enrollment at Baystate.

Baystate and Boston Medical Center continued to report that the very nature of being a parent of a child with medical complexity poses an obstacle to enrollment. Some parents of CMCs are resistant to enrolling their children because they feel overwhelmed with the number of providers and appointments they already face in their daily lives, or they are hesitant to change their current support systems. The 4C nurse care coordinators continue to educate and inform parents of the benefits of care coordination, but they aren't always able to convince parents to enroll.

Boston Medical Center and Baystate used a number of approaches to overcome enrollment challenges. As in the first program year, outreach efforts included communicating directly with PCPs, meeting with families of potential CMC enrollees during their hospital stays, advertising at community health centers, networking with local neonatal intensive care units and pediatric intensive care units, and presenting during hospital staff meetings and at conferences. At the Boston site specifically, the nurse care coordinator invested heavily in relationship building with local service agencies and schools with magnet programs for children with disabilities as a means to foster community awareness of and referrals to the program. Boston Medical Center program leaders also reported trying to make the 4C program more attractive to families in the Boston area by experimenting with different and expanded access to services as compared to other providers in the community, including offering morning and afternoon clinics and home visits.

B. Implementation of the service delivery model

The awardee reported being on track with the implementation of its service delivery model. Boston Medical Center did not make significant changes to its model in the second program year. The 4C multidisciplinary teams in both locations continued to work with CMCs and their families to develop comprehensive care plans and provide care coordination support aligned with the plans.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

> "[We've received] great feedback from parents about how helpful and responsive our team is and how helpful the care plan is. Parents feel like it's an empowering document that gives them a voice and credibility when they meet with other specialists."
>
> *— Project manager*

Program staff described three characteristics of the design of the program that have facilitated implementation: (1) the content of the care plan, (2) ACT.md messaging capabilities, and (3) staff taking primary responsibility for updating the care plans (instead of the PCPs). First, program staff stated that parents continue to value the 4C comprehensive care plan and that it has empowered many parents to better coordinate their children's health and social service needs. Some staff described the care plan as the cornerstone component of the program, something that "sets 4C apart" from other programs. Staff also described this program feature as the "selling point" for the program. In fact, 4C staff said that some parents enroll in the program primarily to develop a care plan, and then access staff infrequently for additional support. The 4C program leaders and staff also indicated that families are more actively using the care plan in the second program year.

Second, respondents described how new, secure, direct, text messaging capabilities that interface with ACT.md at Baystate improved family and provider engagement with the 4C program and improved staff ability to coordinate care for CMCs in the second program year. Program staff noted that the addition of secure messaging improved communication among families, staff, and providers because individuals no longer have to log into ACT.md to check for messages or respond—a common barrier to communication in the first program year. Program staff reported that increased use of secure messaging improved provider response rate and

timeliness as well as care coordination efforts because all team members can view messages within ACT.md in real time and they do not have to copy each other on emails as they did previously.

Third, coinciding with the availability and increased use of secure messaging, program leaders and staff de-emphasized the importance of having providers access ACT.md directly to update care plans. The awardee also decided not to pursue the integration of ACT.md with providers' EMRs until the long-term sustainability of the 4C program is clearer. According to program staff, encouraging PCPs and specialists to learn how to use ACT.md, which is a new system to them, continued to prove challenging in the second year. Because, as one program leader noted, "there is no way to force" providers to use ACT.md, 4C staff are now taking primary responsibility for updating the care plans. Assuming primary responsibility has improved the accuracy and completeness of the care plans. However, staff reported investing a lot of time in conducting patient chart reviews and outreach to providers to identify updates and document the updates in the care plan. According to the project director, the awardee is now more focused on getting families to use and share the care plans with their providers, rather than relying on providers to update the plans.

2. Implementation processes

Program staff said that improvements to data collection and reporting of self-monitoring measures facilitated implementation in the second program year. Program leaders and staff also described four barriers in the implementation process: (1) difficulty maintaining scope of services with increased caseloads, (2) lack of timely communication with the patients' PCPs, (3) workflow challenges and efficiency, and (4) limited patient engagement.

Program staff described one primary facilitator in the implementation process. They used ACT.md more effectively to collect and report self-monitoring measures in the second program year. The 4C team members can now use radio buttons that were recently added to the system to track the number of "acts" completed—such as phone calls, emails, and participant and family visits—as well as the time invested in completing each task. Program leaders were uncertain about the value of many of these and other self-monitoring measures for quality improvement. They also noted the administrative burden of documenting the care coordination efforts. However, they reported that it was motivating and validating for staff to see how much time they spent on various tasks and that the data helped assess the volume of work and time needed for care coordination, which may prove useful in creating a payment model.

With regard to barriers, program leads and staff at both locations reported difficulty providing the same scope of services as in the first program year as their caseloads continued to grow; they anticipated this challenge would be amplified as they reach their enrollment goal. Staff, for example, cannot attend as many in-person appointments with families as they did in the first program year. They also have less time to be proactive and preempt situations for families (for example, when a check-up is due). This is particularly problematic for staff in Boston because they have enrolled a high percentage of children with complex behavioral health and other psychosocial needs, which can be more time-consuming to support than complex medical issues. Program staff also said that some families increased their demands on 4C staff over time as they learned more about the ways that 4C staff can help them and their children, which intensified the workload challenge. Program leaders and staff expressed concern that the

increased and constant demands on staff may lead to staff burnout and a reduced quality of service to all enrollees.

To overcome these challenges, the awardee is standardizing and refining service delivery to be more efficient and using communication tools and processes to ensure the teamwork that is necessary to meet participants' and families' needs and maintain staff morale. The awardee holds quarterly cross-site meetings to share knowledge, collectively problem solve patient issues, and discuss progress stressors. In addition, the family navigators from both locations meet monthly to share experiences and leverage knowledge. Teams at each site also perform chart reviews together so that all staff can serve as a point of contact for patients and step in when needed. Some 4C provider team members we interviewed described feeling stressed despite efforts by the awardee leaders to support and empower staff and find ways to decrease stress.

> "Our panels are really growing and we are starting to feel the pinch. It is really hard when you start out providing a certain level of care. It has to change, because that is just the nature of the process. There is no way we can provide the same quality of care that we do with a panel of twenty patients as opposed to a panel of a hundred and twenty-five."
>
> *— Nurse care coordinator*

To help with caseloads, Baystate added a second multidisciplinary team that is taking on new enrollees while the original team focused on service provision to existing participants. Baystate is also considering slowing enrollment for a short period and triaging initial services to families to first meet their highest-priority needs. Similarly, Boston Medical Center refined service delivery by prioritizing needs that it will address directly and increasing collaboration with and referrals to community social service agencies, which are better suited to meet other needs.

A lack of timely communication from PCPs made it challenging for 4C staff to coordinate participant care was another barrier. In the first program year, 4C team members made recommendations to PCPs based on their comprehensive assessment, but they would not pursue referrals for the participant without the PCP's authorization. Because PCPs were often slow in responding, team members had to spend time continually following up to ensure referrals were made or to receive approval to make the referral themselves—which meant that CMCs had to wait for needed care and services. To overcome this challenge, 4C staff started getting advanced authorization from PCPs and permission to make referrals on their own upon a participant's enrollment.

The program staff in both locations continued to face workflow issues that hindered service delivery. For example, teams continued to explore ways to more effectively gather necessary information and initiate care coordination services prior to the multidisciplinary intake and assessment appointment, so as to not waste time during the appointment. Baystate initiated family navigator home visits in advance of the intake appointment as a routine practice so that preliminary information was already on hand during the office appointments. In light of the effectiveness of this approach, the Boston teams began having social workers phone families to obtain information ahead of the appointment.

> "When the family navigators go out ahead of time, they get to start work in a different way. They see what the families have going on. They can do a lot of things and get a lot of resources ready before the intake visit."
>
> *— Project director*

The Boston teams also started making visits when enrollees came to the hospital for other PCP or specialty care visits. Program staff also streamlined the intake appointment by scheduling staff to be present only for the portions that required their input, rather than the full two-hour meeting. The complex care pediatrician, for example, now only attends the final segment of the appointment to conduct the medical exam. Another workflow issue that hinders 4C efficiency is that the Boston site has not yet figured out how to direct telephone calls to the appropriate team, which means that staff who answer calls from PCPs and specialists can be disrupted and overburdened with information transfer between staff.

Finally, program staff described how the limited engagement of some families made it difficult to provide ongoing coordination and help them achieve the goals set forth in the care plan. Staff said that getting some families to come back for follow-up appointments after the initial assessment and development of the care plan could be challenging. Staff reported that making home visits and using technology—such as commonly used video chat programs and ACT.md's new secure messaging feature—have helped to engage participants and families, particularly those with transportation issues. Staff also continually reiterated the utility of the program to families and encouraged their ongoing participation. They reported that remaining "humble and realistic, and really listening to families' goals" helps keep families engaged during care coordination.

3. Organizational and external context

Program leaders and staff described three barriers in the organizational and external context: (1) the unanticipated psychosocial complexity of patients, (2) families' weak technological skills, and (3) competing institutional priorities.

First, program staff described the unexpected behavioral health and psychosocial complexity of enrolled children and their families as a primary challenge to implementation. As mentioned above, this was particularly true for Boston staff, who did not expect to enroll such a high percentage of children and families with psychosocial issues. Staff indicated that families' nonmedical needs were not only difficult and time-consuming to address, but also often outside their own areas of expertise. Many families, for example, were experiencing housing issues. Staff reported spending an inordinate amount of time working with housing court and trying to connect families with services to overcome these challenges. Staff indicated that the 4C program was designed to support children with medical complexity; a nurse care coordinator expressed concern that she was not trained to handle many of the issues that families of enrolled children faced. They cited many efforts to meet the diverse needs of participants and families, such as making referrals to social service agencies and case workers, who are better able to handle legal, housing, guardianship, and parental mental health matters, for example. As in the first program year, program leaders and staff also attributed much of the 4C program's success to the staff's dedication to working with families.

Second, program staff also noted that families' weak technology skills posed a barrier for some in accessing ACT.md. Staff were working to overcome these obstacles by scheduling a separate appointment, preferably a home visit, to show parents how to use the tool on a home computer or smartphone. Staff believed that the hands-on tutorials were more effective than in-office verbal explanations in supporting parents' use of ACT.md.

Third, program staff reported that the program faces competing institutional priorities and challenges in accessing specialists within both Baystate and Boston Medical Center. As a result of Boston Medical Center's health system facing many competing priorities, for example, it is not investing as much effort as it originally agreed to in identifying high service utilizers as potential 4Cs enrollees. The 4C program also continues to struggle to acquire sufficient clinic time and space within the health system. At Baystate, changes in departmental leadership resulted in a lack of access to some specialists and thus reduced the 4C staff's ability to make referrals. To try to fill the void, a specialist from the Boston Medical Center health system traveled once a month to Baystate to see patients.

C. Development of the payment model

The awardee has developed its payment model based on the theory that if the care provided to CMCs were coordinated and proactively managed, then they and their families would have better access to needed medical, behavioral, and social services, thus reducing hospitalizations and the cost of care. The awardee intended to demonstrate a decrease in costs by obtaining cost and utilization data (claims) for all enrolled participants from participating payers and using the data to track cost, utilization, and quality. The awardee planned to develop a monthly care coordination and consultation fee that was less than the costs saved by payers whose beneficiaries were enrolled in the 4C program but high enough to yield a positive margin for the payers themselves. Fees would be based on actual savings accrued to date on CMCs enrolled in the program.

> "We had hoped that within the first year we would have payers who were feeding us claims data that we could meaningfully hot spot and look at spikes in cost and care utilization on the part of our patients. That hasn't materialized. Even with the first data wave, we are getting claims data that require cleaning up. . . . I feel like we are now just starting to get [payers'] attention. . . . The challenge is there is only under a year and a half to go, so we have to make the best of it and show our impact."
>
> *— Project director*

Although the awardee made progress in obtaining baseline cost and utilization data for some enrolled participants from some participating payers, it has not received enough data from Medicaid managed care organizations (MCOs) to use the data meaningfully in developing a payment model. The personal relationships of the complex care pediatrician in Baystate with the CMC community of advocates and providers and the persistence of the 4C project director have enabled the success that the awardee has had thus far. Interview respondents, though, described payers as lacking the interest or resources to reliably and continually submit data. They also said that the process of requesting data from payers was "slow and difficult." For example, although the awardee received data from one MCO for a set of Baystate patients, the payer has since alerted the 4C program that it no longer has the resources to put together additional data pulls. The awardee also received claims data from MassHealth, but the data were not useable because they were not attached to an eligibility file.

Awardee leaders reported gaining some traction and receptivity among payers, however, in response to preliminary analyses conducted by the awardee with the limited data on hand. The awardee's analyses showed a 55 percent cost reduction for Baystate's 4C patients and a 16 percent cost reduction for Boston Medical Center's 4C patients post-enrollment compared to a period of time pre-enrollment (although, no comparison group was available and results may be

due to regression to the mean). This receptivity, however, was not enough to overcome payers' struggles to submit claims data. Awardee leaders will continue trying to work with payers to obtain the cost and utilization data required to develop their payment model; however, they are concerned that they will be unable to receive and analyze the data before the end of the three-year agreement.

MassHealth's decision to transition from fee-for-service care to a regional ACO model distracted health system leaders from developing their own payment model. Baystate and Boston Medical Center focused much of their energy during the second program year on assembling and submitting proposals to serve as regional ACOs. Although being identified as a MassHealth ACO may provide long-term opportunities for sustainability of the 4C program, this process limited health system leaders' engagement in discussions related to the payment model in the short-term.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Boston Medical Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	321
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,491
Likelihood of all-cause hospitalizations	827
MDE sample size requirement to detect 20% effect	
Total expenditures	873
Likelihood of all-cause hospitalizations	207
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group and patient self-selection high/high refusal rate
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	BMC is collecting beneficiary surveys, but local evaluator is doing analysis; exploring using implementation data on services provided and time spent on each activity

At this point, we do not anticipate being able to conduct a rigorous impact analysis for the awardee due to the low number of participating beneficiaries. The local evaluator is administering beneficiary surveys and plans on analyzing the survey results. We plan to analyze results from our staff and beneficiary surveys. We will also explore the possibility of analyzing data that the awardee collected on its interactions with patients (such as in-person visits, electronic communications, and so on).

V. NEXT STEPS

A. Implementation evaluation

As Boston Medical Center enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

It remains unlikely that we will be able to conduct a rigorous impact evaluation of the program. As noted in the evaluability assessment, there are two significant barriers: small sample size and lack of timely Medicaid/CHIP data. To date, we are only able to identify 75 program enrollees in the CMS Medicaid administrative data, and the most recent Medicaid claims available for Massachusetts are from 2014 Q3.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with Boston Medical Center.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, care coordinators, health coaches, social workers and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

- **A survey of participants who received services, either directly or indirectly, from Boston Medical Center's program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.7.

CARECHOICE COOPERATIVE

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REPORT

APPENDIX B.7

HCIA Round Two Evaluation: CareChoice Cooperative

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Person Centered Care Connections (PCCC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on CareChoice Cooperative's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has CareChoice made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has CareChoice addressed the issues identified during the first program year? What factors have influenced its ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of CareChoice's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the PCCC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to, and any findings from, our analysis of Medicare claims (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

CareChoice, a cooperative of skilled nursing facilities (SNF), senior independent housing, and assisted living communities in Minnesota, used HCIA R2 funds to pilot the PCCC program, which launched in 10 SNFs on January 1, 2015. The program seeks to improve the care and safety of and reduce the total cost of care for post-acute care patients in SNFs who are transitioning back to the community from short-stay or transitional care units (TCUs) within the participating SNFs.[2] CareChoice plans to serve 8,874 participants during its three-year cooperative agreement. In this report, we will refer to all SNF patients who are participating in the PCCC program due to admission to a TCU as participants.[3]

Under the PCCC program, participating SNFs use additional staffing and decision-support tools to do the following:

- Provide transitional care coordination by hiring transition coordinators at each participating SNF. The transition coordinator is responsible for coordinating the development of comprehensive transitional care plans for participants with a multidisciplinary team using a web-based decision-support tool called Engage.[4]

- Use the Engage tool to facilitate collaboration among multidisciplinary teams in each SNF that include transition coordinators, social workers, nurses, admissions staff, and medical records staff. These providers and staff are encouraged to work together through the tool to track and complete transitional care plans for each participant.

- Educate participants and caregivers about their medical conditions and the transition back to their homes. Using modules within Engage, staff educate participants on specific health conditions or general wellness, such as nutrition. With the support of the multidisciplinary team, the transition coordinator prepares a comprehensive transition plan, including copies of all completed learning lessons, and reviews the plan with participants prior to discharge. The transition plan is sent home with participants and faxed to a participant's primary care physician or specialist.

CareChoice leaders are exploring a payment model built around performance-based contracts with payers that will support implementation of the PCCC discharge planning process. They hope these contracts will be able to include hiring a transition coordinator and purchasing the Engage software, while also including a shared savings component designed to reward SNFs

2 A TCU is a unit within a SNF dedicated to participants who are admitted for a short period of time with the goal of transitioning back into the community.

3 Although not all TCU patients will be included in the program's final evaluation data, all of them receive the transition services associated with the PCCC program. Individuals participating in the program but later transferred to a long-term care bed or hospice will be excluded from the data analysis. Patient exclusions are described in more detail in the impact analysis section in this report.

4 The Engage tool was developed by a vendor, Align, which is an organization focused on improving care transitions in post-acute care settings.

that meet quality metrics and achieve reductions in the overall cost of care for TCU stays and for 60 days of care following discharge.

CareChoice expects a 20 percent reduction in hospital readmissions that occur within 30 days after a patient has been discharged from a TCU. The awardee also hopes to achieve reductions in other outcomes such as the 90-day all-cause hospitalization rate, the 90-day outpatient emergency department (ED) admission rate, and the 90-day unplanned readmission rate, but has not provided amounts for the expected reductions in these rates. The awardee estimates that the intervention will yield a 3.5 percent reduction in total Medicare spending for program participants.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by CareChoice during the first year of its cooperative agreement.

- Transition coordinators were hired at each facility (in some cases, these roles were filled by existing staff); program staff were trained and using the Engage decision support tool; and SNF staff were providing comprehensive, written transition plans to patients before they were discharged to home.
- Frontline staff and SNF leaders reported that participants and families were more engaged and were more consistently prepared to safely transition home.

We also identified several initial challenges in implementing the program and CareChoice's strategies for addressing them.

- Staff turnover and vacancies resulting from the departures of transition coordinators were a challenge. To address this, the PCCC program leader created a transition coordinator sustainability plan and worked with SNFs to address the challenges associated with staff turnover.
- Lack of consistent, multidisciplinary buy-in across facilities was a challenge. To address this, CareChoice leaders worked with SNF leaders and transition coordinators to reinforce the importance of engaging staff across disciplines—for example, by having multiple staff at each facility use Engage and work closely with the transition coordinators.

Finally, we identified several early lessons learned by CareChoice in implementing its program.

- Multidisciplinary team engagement was needed to support the transition coordinators' efforts to create a more robust transition planning process.
- The level of program engagement and commitment from facility leaders, including support for a multidisciplinary approach to transition planning, were important to the program's success.
- The regular presence and availability of PCCC program staff at participating SNFs (1) reinforced program processes, such as working with team members of all disciplines;

(2) provided continuous technical assistance on software; and (3) educated facilities on how to monitor their own performance.

- An emphasis on proper documentation and the development of additional data tracking systems for performance measurement and monitoring were also needed.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, CareChoice made progress in the following areas:

- The awardee achieved 65.4 percent of its enrollment goal and is on track to meet its three-year target.
- CareChoice leaders continued to systematically identify areas for improvement and corresponding solutions, with the help of internal stakeholders. They made subsequent process improvements and refinements to the Engage software and in program monitoring.
- CareChoice obtained permission to use carryover funds to further develop an expanded payment model, which will leverage commercial payer performance contracts after the cooperative agreement ends.

Over the past year, CareChoice made no major changes to the design of its program. Below we note several challenges that CareChoice worked to address in the second year of its cooperative agreement.

- CareChoice leaders continued to seek solutions to improve processes in underperforming SNFs without increasing reporting requirements.
- CareChoice and SNF staff members continued to work on mitigating the impact of staff turnover at participating SNFs.

As CareChoice enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Performance on self-reported measures and targets will continue improving in the final year of its cooperative agreement.
- CareChoice leaders are planning to identify quality metrics that will be linked to shared savings payments and to develop risk adjustment models for specific target populations for the payment model.

Table 1. CareChoice: PCCC characteristics at a glance

Program characteristic	Description
Purpose	SNFs will use transition coordinators to improve the process of transitioning back into the community using a web-based decision support tool (Engage). This should reduce unnecessary hospital readmissions and total cost of care and improve patient and family satisfaction.
Components	• Transitional care coordination. Improved transition process with increased communication among a multidisciplinary transition team and more comprehensive transition documentation for patients and caregivers. • Quality improvement and workflow process redesign. Implement a web-based decision support tool to better identify opportunities to improve the quality of transition planning services and identify potential process improvements to enhance this effort. • Education and training. (1) Increase training with multidisciplinary team about its role in ensuring smooth transitions for patients back into the community and (2) provide education for patients and families about patient diagnoses and the transition plan during the patient's stay on the TCU.
Target population	TCU patients in participating SNFs who are returning to the community
Theory of change/theory of action	The PCCC program will reduce the total cost of care as well as hospital readmissions for post-acute SNF patients through improved care and safety of patients as they return to their homes in the community.
Payment model	New fee-for-service (FFS) payment, value-based payments, shared savings
Award amount	$3,347,584
Launch date[a]	January 1, 2015
Setting	TCUs in participating SNFs
Market area	Urban, suburban
Market location	MN
Outcomes	• Reduced total cost of care • Reduced hospital readmissions • Increased patient and family satisfaction and understanding of the discharge plan

[a]After the initial planning period, the awardee's program began to operate as of this date.

SNF = skilled nursing facility; TCU = transitional care unit

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by CareChoice in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 through June 24, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct eight telephone interviews with the following program staff:

- Three program leaders at CareChoice
- 17 PCCC SNF staff, during five interviews
- Two internal evaluators for the PCCC program

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[5] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

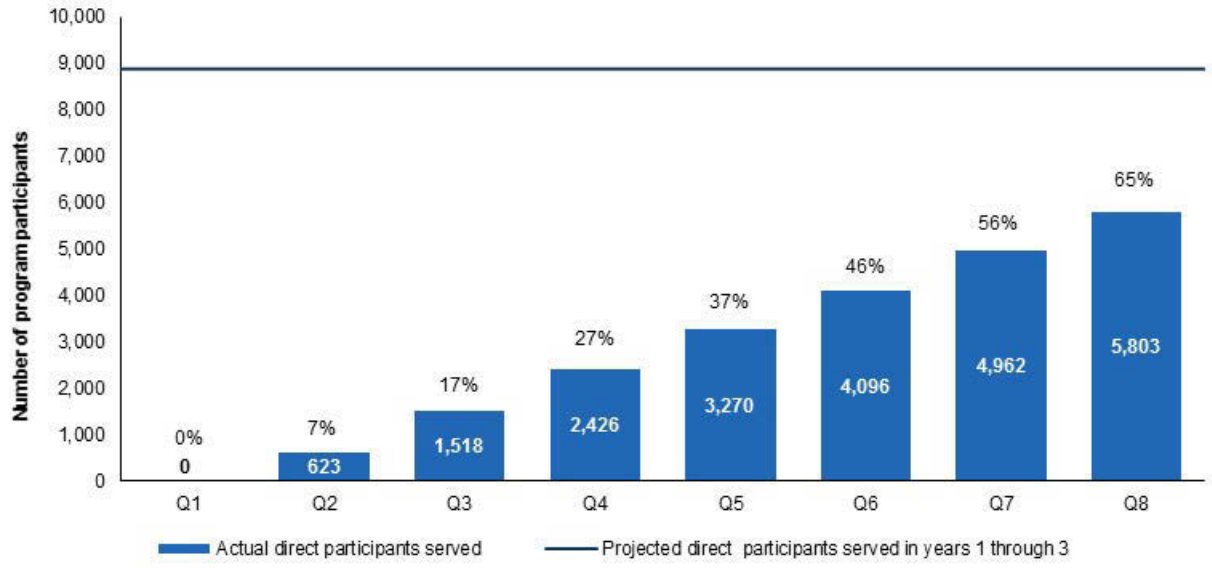
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, the service delivery model, and the payment model. Each area includes an update on CareChoice's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[5] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, CareChoice reported to the implementation and monitoring contractor that it directly served 5,803 participants from January 2015 (the launch of its program) through August 2016, which represents about 65.4 percent of its 8,874 projected direct participants (Figure 1). CareChoice staff acknowledged that enrollment was slightly lower than expected, but did not attribute this to any internal or external factors in particular. However, the awardee still expects to be able to meet its three-year enrollment target. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. CCC does not have indirect participants.

B. Implementation of the service delivery model

Program leaders did not make any major changes to CareChoice's service delivery model in the second program year. Instead, they focused on continuously improving their processes and the quality of care specific to transition planning. They also addressed ongoing challenges, such as staff turnover. This was facilitated by (1) an earlier grant that involved training staff to avoid hospital readmissions and (2) technical assistance from Align for the Engage tool. With the help of internal stakeholders, PCCC program staff also implemented a systematic strategy to identify problems in program implementation and develop an action plan to address them.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

CareChoice's past experience with the Resident Centered Care Connections (RCCC) grant continues to facilitate program implementation of the more robust PCCC transitional planning process because all 10 PCCC participating SNFs also participated in the RCCC grant. This grant introduced care transition principles, primarily focused on reducing avoidable hospitalizations and planning for palliative and end-of-life care, which provided the SNFs with experience in using evidence-based quality improvement processes. These processes served as a foundation for the workflow redesign efforts and ongoing improvements in transitional care delivery in the PCCC participating SNFs.

2. Implementation processes

Staff turnover—a common phenomenon among SNFs—continued to be a problem for PCCC during the second year of the program. In addition to the normal turnover of frontline staff in SNFs, CareChoice leaders reported turnover among key administrative staff at several facilities, including a director of nursing at one participating SNF. To mitigate the impact of staff turnover, CareChoice leaders have worked closely with staff at each SNF to develop contingency plans to implement the PCCC program in the event of staff turnover. Program leaders reported that multidisciplinary teamwork and cross training have helped mitigate the effect of staff turnover. In addition, CareChoice and SNF leaders regularly emphasized the importance of engaging a multidisciplinary team in the transition planning process, which was especially helpful in addressing staffing and coverage issues and increasing overall buy-in and support for robust transition planning.

> "We have different areas within the facility working with Engage. We have dietary, social services, occupational therapy, physical therapy, and the nursing coordinators. The dietary team is very hands-on with all of our residents. They meet one-on-one and coach the patients through the lesson. They are very active in putting information into Engage and working with the patients. Social services is involved in helping them with their living situations, especially if they are going to be using hospice or other community resources."
>
> *— SNF staff member*

In the past year, PCCC program and SNF leaders also collaborated with Align and Stratis[6] on performance reporting to ensure that the program was being implemented as intended. They worked with SNF staff to identify opportunities for quality and process improvement, which yielded improvements in the self-reported program targets. For example, by reviewing monthly monitoring reports and following up with SNF staff members, CareChoice leaders identified one facility that was not consistently making follow-up calls to participants 90 days after discharge from the SNF. Upon investigation, CareChoice leaders and SNF staff members at this facility realized that the Engage tool wasn't sending alerts for the required 90-day follow-up calls. They also determined that transition coordinators needed more training on how and when to make the calls in a timely manner. To address these issues, Align corrected the Engage software so that the alerts functioned properly and CareChoice provided additional training to the transition coordinator.

> "We were able to get a specific percent of compliance for each of our facilities, which we hadn't had access to before . . . [and] were able to determine what additional support each facility needed."
>
> — *PCCC leader*

CareChoice also discovered through the process of identifying opportunities for quality and process improvement that inaccurate data entry had resulted in artificially poor performance scores on several outcome measures. PCCC leaders conducted a root cause analysis by speaking with frontline staff and administrators. They learned that some transition coordinators were not entering data in the correct fields within Engage, which resulted in incorrect reporting of transition planning activities. In response, CareChoice retrained transition coordinators on data entry and reporting processes. The awardee also modified the wording of a few titles and data field descriptions in Engage to ensure clarity and improve reporting accuracy.

CareChoice leaders closely monitored SNFs' performance by requiring staff to populate an Excel-based report with performance measures. CareChoice used these reports to quickly identify and provide assistance to SNFs that were not meeting their targets, especially with regard to following up within 30 days after discharge. Although the Excel reports enabled CareChoice leaders to monitor and address issues more effectively, they resulted in duplicative work for the transition coordinators, who had to enter the same data in different places.

> "Our medical records system doesn't talk to Align. . . . There is a lot of data entry. . . . We have to enter demographics, medications . . . et cetera. It is cumbersome entering [data] in several places. Before, we would track this information, but not as efficiently as [we can through] Align."
>
> — *SNF staff member*

[6] Stratis is the organization that CareChoice hired to conduct an internal evaluation of the PCCC program.

3. Organizational and external context

With the implementation of the Improving Medicare Post-Acute Care Transformation Act of 2014 (IMPACT Act) and similar health reforms impacting SNF care, CareChoice leaders and participating facilities reported experiencing increased pressure from payers and regulators to shift to a value-based payment system that rewards improving performance and reducing costs. CareChoice leaders report that market forces in Minnesota are particularly strong given that many of its largest integrated delivery systems have become accountable care organizations (ACOs), with incentives that focus on total cost of care, including post-acute services. CareChoice indicated that some ACOs are beginning to develop preferred post-acute care networks with SNFs that have lower hospital readmission rates and high performance on quality metrics. To position CareChoice as the preferred provider of SNFs and post-acute care facilities for ACOs, CareChoice leaders hope to leverage the experience gained through their participation in HCIA R2 as well as their implementation of previous initiatives to demonstrate value to payers and purchasers as they continue to focus on improving transitions of care and patient outcomes. CareChoice also intends to develop protocols around telemedicine, patient engagement, medication therapy management, care coordination, and community paramedicine in its efforts to become a more attractive post-acute care provider in the state.

> "We are especially mindful of the intention of the IMPACT Act and believe our PCCC project is a step in the right direction"
>
> — *CareChoice leader*

C. Development of the payment model

CareChoice is developing a payment model that will contain two main elements.[7]

1. **An advance payment component**, which will help support implementation of the PCCC transition planning process. This may be in the form of a Resource Utilization Group (RUG)–based payment per resident, plus a percentage payment arrangement for certain RUG codes. The advance payment component is intended to cover the up-front costs of hiring transition coordinators and leasing the Engage software.
2. **A shared savings component**, which will be designed to reward SNFs that meet quality metrics and achieve reductions in the overall cost of care for a more comprehensive bundle of post-acute care services for TCU stays and for 60 days after discharge.

CareChoice's current payer performance-based contracts will serve as the starting point for the proposed payment model. However, program leaders anticipate that developing quality metrics for a broader set of post-acute services (for example, home health services), as well as the risk adjustment approach to reflect the increasing acuity of SNF patients will be challenging. These elements may even be the foundation for developing an alternative bundled

> "We are in a city of five ACOs. . . . We need to be ACO and bundle ready."
>
> — *CareChoice leader*

[7] CareChoice received carryover funds to explore a true total cost of care, including an assessment of HCC risk scores for 30-, 60-, and 90-day impacts of the PCCC model. However, these plans are currently on hold due to data delays.

payment model, which would eventually replace the existing agreements. An alternative payment model tied to an expanded set of quality metrics agreed upon by all payers may help CareChoice become a preferred post-acute care network for a number of Minnesota ACOs.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE FEE-FOR-SERVICE (FFS) ENROLLMENT AND CLAIMS DATA

This section summarizes findings regarding the baseline characteristics of beneficiaries admitted to CareChoice facilities, as identified from Medicare SNF claims. To be eligible for the PCCC program, a prospective participant must be a post-acute patient who was admitted to one of 10 participating CareChoice SNFs after January 1, 2015. The target population excludes patients who die during the SNF stay, are enrolled in hospice care, leave against medical advice, return to the hospital during the SNF stay, or transfer to long-term care or another SNF. Beneficiaries are considered to be enrolled in the program from the day of a SNF admission through 90 days following a SNF discharge.

A. Baseline characteristics of the treatment group

CareChoice Cooperative began to enroll Medicare and Medicaid beneficiaries in the PCCC program in January 2015. The Medicaid sample is not expected to be large enough to detect an impact on key outcomes and will not be included in the impact evaluation. For this report, we did not rely on the finder file because we were unable to resolve numerous discrepancies between that file and the beneficiaries we identified as admitted to CareChoice facilities under the Medicare SNF benefit. Instead, we extracted SNF claims data for beneficiaries who were admitted to participating SNFs from January 1, 2015, through May 31, 2016, and applied the awardee's inclusion criterion of discharge to home by using the SNF claims Patient Discharge Status Codes 01, 06, 81, and 86. We included beneficiaries enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for those most recently admitted. This resulted in a sample of 1,829 beneficiaries.

For the purpose of presenting baseline characteristics in this report, we further restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS (both Parts A and B), with Medicare as the primary payer at the time when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all evaluation criteria for a period of at least 90 days within the baseline year (the 365 days immediately prior to their enrollment). This resulted in elimination of 897 beneficiaries from the sample of 1,829 beneficiaries. A total of 932 Medicare beneficiaries met the above eligibility criteria and were included in the analysis.

The calendar period covered by the baseline quarters is based on the enrollment date, which is defined as the SNF admission date for each participant and therefore varies by participant. Demographic and health status characteristics of these participants are shown in Table 2. The majority of participants are age 75 or older: 35 percent are age 75 to 84, while 39 percent are age 85 or older. Only 10 percent of participants are younger than 65. Most participants are female (66 percent) and white (92 percent). Seventeen percent of participants were originally enrolled in Medicare because of a disability; close to one percent were originally enrolled because of end-stage renal disease (ESRD). Twelve percent of participants are dually eligible for Medicare and Medicaid, although in some cases Medicaid benefits may be restricted to the payment of co-insurance and deductibles. The average hierarchical condition category (HCC) risk score for participants (2.66) is nearly 2.7 times higher than the average score for Medicare FFS beneficiaries nationwide (1.0). More than three-quarters of the participants have HCC risk scores higher than the national average, with the 25th percentile being 1.51 and 75th percentile being

3.57. These data indicate that PCCC program participants have substantially poorer health status and greater needs for care than most Medicare FFS beneficiaries.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 932)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	92	10
65 to 74	150	16
75 to 84	326	35
85 and older	364	39
Gender		
Female	616	66
Male	316	34
Race		
White	860	92
Black	54	6
American Indian, Alaska Native, Asian/Pacific Island American, or other	16	2
Hispanic	2	0.21
Original reason for Medicare eligibility		
Old age and survivor's insurance	763	82
Disability insurance benefits	160	17
ESRD[a]	9	0.97
Hospice[b]	5	0.54
Medicare/Medicaid dual status, percent dual[b]	109	12
HCC score[c]		Statistic
Mean		2.66
25th percentile		1.51
Median		2.23
75th percentile		3.57

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary was admitted to a SNF. For beneficiaries with multiple SNF stays, the enrollment date is the admission date for the first SNF stay. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

The participants had high rates of service use and Medicare expenditures in the 365 days before enrollment, which is consistent with their recent hospitalizations and SNF admissions. In Table 3, we report baseline utilization and expenditure data for a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation (CMMI). CareChoice expects to reduce hospital readmissions and outpatient ED visits for up to 90 days after a SNF discharge, compared with baseline year rates. If reductions in post-discharge hospitalizations and ED visits are realized, then the program should result in a similar decline in post-discharge Medicare expenditures.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	932	918	925	932	932
Average Medicare expenditures PBPM[a]					
Total	3,509 (91)	1,405 (125)	1,309 (99)	1,541 (108)	9,704 (233)
Acute inpatient	1,776 (56)	475 (62)	469 (61)	558 (61)	5,560 (174)
Inpatient other[b]	92 (19)	106 (42)	22 (14)	14 (14)	225 (57)
Outpatient[c]	258 (18)	206 (21)	219 (19)	242 (23)	354 (25)
Physician services	504 (15)	298 (16)	310 (19)	344 (18)	1,059 (26)
Home health	126 (9)	96 (13)	121 (14)	141 (15)	147 (14)
Skilled nursing facility	710 (21)	201 (34)	133 (27)	195 (31)	2,293 (53)
Hospice	15 (7)	6 (6)	11 (7)	17 (9)	25 (11)
Durable medical equipment	28 (5)	17 (2)	24 (3)	30 (7)	40 (12)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,675 (40)	567 (55)	569 (63)	689 (64)	4,841 (81)
Outpatient ED visits	699 (49)	624 (75)	595 (67)	651 (62)	918 (83)
Observation stays	235 (20)	131 (23)	187 (32)	194 (32)	412 (43)
Primary care visits in any setting	13,999 (339)	9,162 (401)	8,939 (377)	10,260 (442)	27,481 (774)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Health care utilization rates (annualized per 1,000)					
Primary care visits in ambulatory settings	8,193 (225)	7,221 (299)	7,146 (269)	7,964 (306)	10,412 (360)
Specialist visits in any setting	14,367 (406)	10,157 (454)	10,081 (465)	10,696 (441)	26,399 (811)
Specialist visits in ambulatory settings	8,366 (285)	7,740 (352)	7,719 (337)	8,114 (328)	9,871 (342)
Measures of any health care utilization					
Percentage with a hospital admission[d]	97 (1)	12 (1)	10 (1)	14 (1)	96 (1)
Percentage with an outpatient ED visit[e]	37 (2)	12 (1)	11 (1)	13 (1)	17 (1)
Percentage with an observation stay[f]	18 (1)	3 (1)	4 (1)	4 (1)	9 (1)
Percentage with a 30-day readmission among all discharges	17 (2)	12 (3)	22 (4)	18 (3)	15 (2)
Percentage of participants with a readmission among all participants	7 (1)	1 (< 0.5)	2 (< 0.5)	2 (1)	3 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month.

We examined the baseline cost of care by calculating average per beneficiary per month (PBPM)[8] Medicare payments in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $3,509, with the average PBPM Medicare payment for inpatient services ($1,776) being the largest driver of total cost of care. SNF payments in the fourth baseline quarter were considerably higher than in the first three baseline quarters, making SNF payments the second-largest driver of total cost of care in the baseline year. We noted that the SNF stays ending in discharge to home that were included in our treatment group were often preceded by SNF stays ending in discharge to a hospital, which were not included in our treatment group. SNF costs associated with these stays ending in hospitalization explain the high SNF payments in the last baseline quarter. In future reports, we will assess the benefit of creating SNF episodes of care—for example, by linking SNF stays less than 30 days apart into a single SNF episode and by defining the SNF admission date as the date the beneficiary was first admitted in the episode. We will also determine the awardee's methodology for defining admission date in their finder file, including whether the awardee creates SNF episodes of care prior to defining the admission date.

The rate of acute care hospitalizations was 1,675 per 1,000 Medicare FFS beneficiaries per year during the baseline year, with 97 percent of beneficiaries having at least one hospitalization during the 365 days before a SNF admission. As expected, the rate of acute care hospitalizations per 1,000 beneficiaries per year was highest in the fourth baseline quarter (4,841), compared with the first through the third baseline quarters (which ranged from 567 to 689). Ninety-six percent of beneficiaries had at least one hospitalization during the fourth baseline quarter.

In the baseline year, 17 percent of all hospital discharges in the treatment group were followed by a readmission in the 30-day post-discharge window, slightly below the national average for Medicare beneficiaries.[9] At the beneficiary level in the baseline year, 7 percent of all Medicare beneficiaries had a hospitalization with a readmission in the 30-day post-discharge window. It is important to highlight that the percentage of beneficiaries with a hospitalization was highest during the baseline fourth quarter (96 percent, compared with 10 percent to 14 percent in the first through third baseline quarters) and that a large proportion of those hospital discharges occurred on the last day of the baseline year. Thus, 30-day readmissions associated with hospital discharges in the last 30 days of the baseline year are not reflected in the baseline readmission measures because those readmissions would fall beyond the end of the baseline year.

The rate of ED visits that did not lead to a hospitalization was 699 per 1,000 beneficiaries per year in the baseline year; the rate of ambulatory observation stays was 235 per 1,000 beneficiaries per year in the baseline year. Furthermore, there was an increase in both measures in the fourth baseline quarter compared with the first through third quarters. In the baseline year, the rate of primary care visits in any setting was 13,999 per 1,000 Medicare FFS beneficiaries per year, while the rate of specialty visits in any setting was 14,367 per 1,000 beneficiaries per

[8] Months referred to in our calculations are 30-day periods rather than calendar months.

[9] Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

year. As expected, the rate of primary care and specialty visits was considerably higher in the fourth baseline quarter compared with the first through third baseline quarters.

In upcoming reports, we will expand our reporting of baseline utilization and expenditure characteristics. Because the intervention effect might vary for certain subgroups of beneficiaries, we will report the percentage of beneficiaries that, on an a priori basis, may differ in their likelihood of readmission to a hospital or a SNF. Potential subgroups include diagnosis-based subgroups (for example, neurological, cardiorespiratory, or orthopedic) or individuals with cognitive deficits (for example, those with and without dementia). Furthermore, we will examine patterns of acute care and primary care services and expenditures during the 90-day period following discharge from a SNF for the treatment group only. We will also request data from CareChoice on measures related to implementing the PCCC program—including whether a transition plan or a post-discharge continuing care plan was created for a patient—and measures of patient and family satisfaction gathered at 30 and 90 days after a SNF discharge. Subject to receiving these data from CareChoice, we will include in future reports a descriptive trend analysis of these awardee-specific measures for the treatment group.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: CareChoice

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	1,425
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	458
Likelihood of all-cause hospitalizations	763
MDE sample size requirement to detect 20% effect	
Total expenditures	115
Likelihood of all-cause hospitalizations	191
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We expect to construct a comparison group from Medicare beneficiaries initiating SNF stays at matched nursing facilities in Minnesota. We have created a preliminary comparison group, but have found that it does not closely match the treatment group and so will require further adjustment before we can produce initial impact estimates.

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V. NEXT STEPS

A. Implementation evaluation

As CareChoice enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will explore ways to ensure balance between the treatment and comparison groups, including the need to conduct propensity score matching at the beneficiary level. We will use a difference-in-differences design to test for intervention effects among Medicare FFS participants at participating SNFs relative to the comparison group of patients from nonparticipating SNFs.

If the total number of participants who are covered by Medicaid is sufficient to merit analyses, we may also work with Medicaid data. At this stage, it appears that the total number of participants covered by Medicaid may be fewer than 250 individuals, so it is possible that the sample size will not merit further analysis. Our intent is to also include dually eligible participants in the analysis. However, because of the small numbers of dually eligible participants and because the awardee is not collecting participants' social security numbers, it may not be possible to conduct separate analyses on dually eligible participants.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include administrators, nurse managers, registered nurses, transition coordinators, social workers, physical and occupational therapists, transitional care unit staff, and other administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.8.

COMMUNITY CARE OF NORTH CAROLINA

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REPORT

APPENDIX B.8

HCIA Round Two Evaluation: Community Care of North Carolina

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Optimizing the Medical Neighborhood: Transforming Care Coordination through the North Carolina Community Pharmacy Enhanced Services Network (CPESN), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Community Care of North Carolina's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Community Care of North Carolina made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Community Care of North Carolina addressed the issues identified during the first program year? What factors have influenced the awardee's and its sites'/implementation partner's(s') ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Community Care of North Carolina's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CPESN (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and non-clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Community Care of North Carolina is using funding from HCIA R2 to create the CPESN, which was launched on March 1, 2015. This innovative, community-based care delivery and payment model is intended to motivate community pharmacists to focus on improving medication management for the most at-risk patients. Pharmacists also offer other enhanced services, including medication reconciliation, referrals for behavioral/mental health services and for home and community-based services, and support for improving a patient's self-management and informed decision making. A key aspect of CPESN is the integration of pharmacists within a larger care team, including primary care providers, specialty providers, and the extended care team of the Patient Centered Medical Home (PCMH). Community Care of North Carolina is moving toward paying pharmacies through an alternative pay for performance payment model that combines risk and value-based payments with a per beneficiary per month (PBPM) payment for all high-risk patients enrolled with a pharmacy. The awardee plans to roll this out in the third year of the program.

To be eligible for the program, individuals must be enrolled in Medicare, in the state's Medicaid fee-for-service (FFS) or S-CHIP program, or they must be dually eligible for Medicaid and Medicare. Using claims data from Medicaid and S-CHIP, the awardee identifies patients who have one or more prescription medications for a chronic medical condition and 80 percent of their prescriptions filled at a participating pharmacy in the previous 90 days. Beneficiaries not identified in claims data may enroll if, in the professional judgment of the pharmacist, they need additional medication management services and meet the eligibility requirements.

Participating pharmacies use PHARMACeHOME, a pharmacy information exchange platform, in two ways: (1) to understand a patient's prescription history in order to deliver effective medication management services and (2) to support the coordination of care by serving as an extension of the PCMH care manager. These services are expected to reduce hospital readmissions and visits to the emergency department (ED) in that pharmacists will be proactively giving patients the medication assistance they need.

Program leaders also expect pharmacists to become more involved in the delivery of care as they provide a level of medication management that is commensurate with the needs and health status of attributed patients. This shift in pharmacists' incentives from the traditional encounter-based payment model for Medicare, Medicaid/CHIP, and dually eligible patients will compel them to deliver services that lower total health expenditures and produce a strong return on CMS's investment over the three-year cooperative agreement.

Outcomes measures include better adherence to medication regimens; better health outcomes, such as fewer exacerbations in patients who have asthma and improved blood sugar management in beneficiaries who have diabetes; and a higher degree of patient satisfaction with care. Table 1 provides additional details on the program.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Community Care of North Carolina during the first year of its cooperative agreement.

- The awardee recruited and trained staff from 123 pharmacies to provide a comprehensive initial pharmacy assessment (CIPA) of patients prescribed chronic disease medications.
- The awardee established an initial payment model to motivate pharmacists to serve as active members of a patient's medical home.
- Performance monitoring data were used to provide targeted, individualized technical assistance to pharmacies challenged by program requirements.

We also identified several initial challenges in implementing the program and Community Care of North Carolina's strategies for addressing them.

- Incorporating CIPAs into the pharmacy workflow was a major challenge. The awardee provided intensive technical assistance to pharmacies that have struggled the most (that is, those that have not completed or have barely completed CIPAs). The assistance addressed barriers to completing the CIPAs such as entering data into PHARMACeHOME, the awardee's information technology system, and identifying which patients to target for what services.
- After becoming aware of confusion among participating pharmacists about the different levels of program services, Community Care of North Carolina more clearly defined, and provided training on, the different levels of enhanced services that participating pharmacies could provide.
- The awardee addressed the ongoing challenge of capturing patient-pharmacist interactions in PHARMACeHOME through linkages with pharmacy management systems already used by community-based pharmacies.

Finally, we identified several early lessons learned by Community Care of North Carolina in implementing its program.

- The first year of implementation confirmed what a major change the program has created for the pharmacies. Because all of the pharmacies and processes are set up to dispense and bill for medications, the shift to a more patient-centered approach with value-based payments has been massive and is best done iteratively.
- Bringing 123 pharmacies into the program all at once was burdensome for program staff. For pharmacies joining the program in Year 2, the awardee planned to engage the pharmacies incrementally through regional trainings and individualized technical assistance.
- At first, some providers were reluctant to have pharmacists play a more active role in patient care, but most providers gradually accepted and have come to appreciate this level of engagement from pharmacists.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Community Care of North Carolina made progress in the following areas:

- Despite plans to incrementally increase the size of the network in Year 2, the awardee greatly increased the number of participating pharmacies to 227. The growth of the network helped to increase the number of patients receiving CIPAs with follow-up.
- The awardee calculated and released to participating pharmacies the first iteration of ratings on performance measures. The performance-based ratings were well-received by the pharmacies and deemed helpful for improving patient care.
- Community Care of North Carolina partnered with a pharmacy health information technology (health IT) vendor to add risk scores for attributed patients to pharmacy records so that pharmacists can more easily identify high-risk patients who need enhanced services.
- The awardee provided technical assistance and training to pharmacies in several ways. Most notably, it collaborated with industrial engineers at North Carolina State University to assess the workflow at high-performing pharmacies.[2] Findings from these assessments benefited these pharmacies and contributed to the growing knowledge base on the best ways to instruct pharmacies on how to reorganize their workflows to provide enhanced services.

Below we note the key challenges that Community Care of North Carolina has worked to address in the second year of its cooperative agreement.

- The awardee experienced growing pains in terms of not having staff capacity to provide ongoing, hands on support and management for a network of participating pharmacies that nearly doubled in size. To mitigate these growing pains, staff provided targeted technical assistance to the pharmacies that needed the most support and engaged Year 1 pharmacies to mentor new pharmacies. In addition, the awardee does not plan to recruit more pharmacies in Year 3 so that they can work to stabilize current, participating pharmacies.
- Many pharmacies have needed intensive guidance from Community Care of North Carolina to implement the program; this has strained the awardee's resources. The awardee is shifting the type of support it offers, such as providing on-site technical assistance to pharmacies who need targeted workflow support and created a "change package" that can be distributed to a pharmacy at any stage with step-by-step instructions on how to better implement enhanced services.
- High-performing pharmacies have more high-risk patients on their attribution lists because they get more referrals for these patients. As a result, the pharmacists' have had to make additional adjustments to their workflows to devote more time and resources to managing the medication needs of these patients. Furthermore, the awardee is working with North

[2] High-performing pharmacies identified in site visits and through other technical assistance activities tend to have similar attributes, including workflows that have been adjusted to provide enhanced services, good communicating with physicians and care teams, and regular referrals.

Carolina State University to find ways to improve workflows at high-performing pharmacies that are managing medications for higher-risk patient populations.

As Community Care of North Carolina enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- As performance measures for the alternative payment model are rolled out, the awardee anticipates that the current ratings may not accurately reflect the performance of high-performing pharmacies that are attracting referrals for high-risk patients. Lower rates of medication adherence and higher rates of hospitalization among high-risk patients just entering the program have contributed to lower-than-anticipated ratings for some of the otherwise high-performing pharmacies.
- Given the rapid increase in the number of participating pharmacies, the awardee is developing a change package that will help a wide spectrum of pharmacies implement the program as intended. This package, expected to be rolled out in Year 3, will incorporate lessons learned from the first two years of the program and provide a resource for sustaining the enhanced services delivered in participating pharmacies.
- In Year 3, the alternative payment model will shift from paying pharmacies according to the number of completed CIPAs to paying them on the basis of their follow-up care and medication management. Pharmacies are motivated by the model because they feel that it will reimburse them for the clinical care they have already been providing to patients. As the program continues into Year 3, the awardee envisions this high level of pharmacy-patient engagement as a path towards sustainability.

Table 1. Community Care of North Carolina: CPESN characteristics at a glance

Program characteristic	Description
Purpose	The CPESN is an innovative service delivery and payment model that integrates medication management strategies into the interactions between patients and community pharmacists while giving pharmacists the incentive to address gaps in care.
Components	• Create a payment model that provides pharmacies with incentives to address gaps in care • Leverage an integrated care management and medication management information platform (PHARMACeHOME) to enhance care delivery by involving pharmacists more directly in patient care • Determine best practices for delivering the enhanced program services and training pharmacists throughout NC so that implementation is statewide • Implement continuous quality care improvement across all participating pharmacies to establish a more standard, lower cost approach to patient care
Target population	Medicaid and Medicare beneficiaries who have one or more chronic medical conditions treated through medication or who are identified by either a referring physician or the pharmacy itself as needing intervention
Theory of change/theory of action	By enhancing the role of pharmacists in the ongoing management of patients with chronic diseases, medical costs can be reduced, and the quality and coordination of care can be improved.
Payment model	New fee-for-service payment, value-based payments, and capitated payment for care management/coordination services
Award amount	$15,634,150
Launch date[a]	3/1/2015
Setting	Participating community pharmacies
Market area	Patients served by participating community pharmacies
Market location	NC
Outcomes	Improved clinical outcomes and a reduction in total annual health care expenditures by at least $30 million by 2017

[a]After the initial planning period, the awardee's program began to operate as of this date.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Community Care of North Carolina in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 through 23, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders
- Performance analytics lead
- Pharmacy engagement lead
- Pharmacists/owners at participating pharmacies
- Multi-state collaborative lead
- Industrial engineer collaborators

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

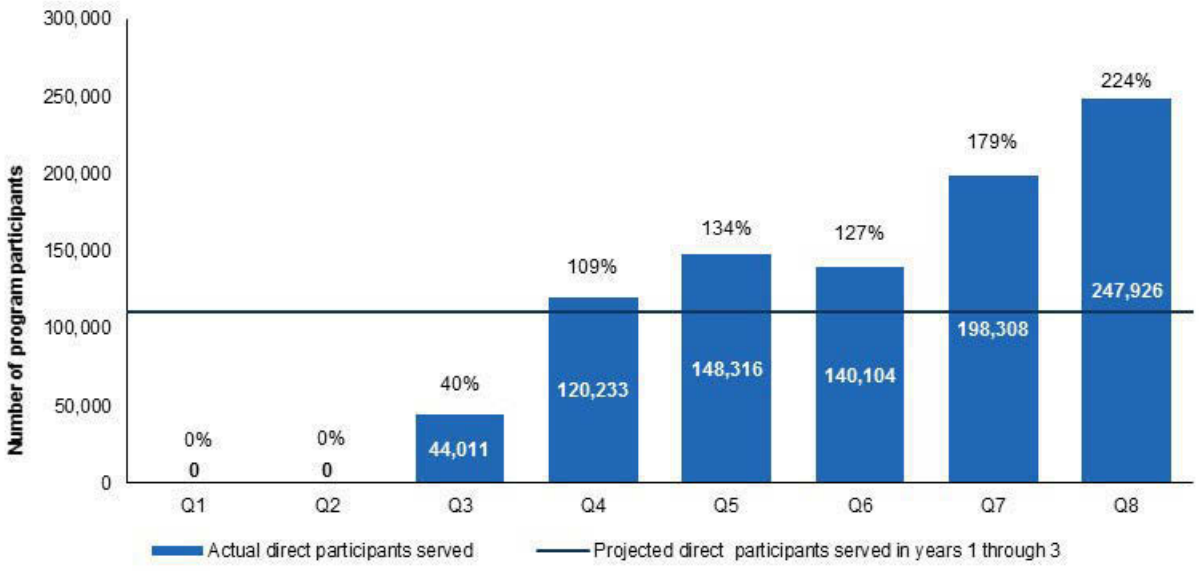
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the awardee's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Because participants are attributed to a CPESN pharmacy, this discussion of enrollment focuses on both the growing number of pharmacies in the CPESN and the corresponding number of participants. Community Care of North Carolina reported to the implementation and monitoring contractor that it directly served 247,926 participants from March 2015 (the launch of its program) through August 2016, which represents about 224 percent of its 110,732 projected direct participants (Figure 1). It is important to note that these numbers reflect the number of Medicare beneficiaries and Medicaid and S-CHIP enrollees attributed to pharmacies operating under the alternative payment model. This number does not reflect the number of participants receiving enhanced pharmacy services. About 15,000 unique participants have received intensive, enhanced services through a CIPA across all participating pharmacies. This figure is nearly 40 percent of the program's target of reaching 40,000 patients with community pharmacy care management (CIPA with follow-up coordinated with the rest of the care team). The baseline characteristics of participants who we are able to identify in Medicare FFS enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016). These data are provided by the awardee and have not been verified.

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2016. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

The total number of direct and indirect participants served and the percentage of the three-year target met appear to be inflated. They reflect the number of attributed participants, not the total number of unique participants who have received services directly from a participating pharmacy. We do not have an estimate of the number of direct participants served, and Community Care of North Carolina does not have any indirect program participants.

According to leaders at Community Care of North Carolina, the CPESN grew faster than anticipated. Word of mouth from participating pharmacies and Year 1 resources helped the awardee to increase the number of pharmacies from 123 in Year 1 to 227 in Year 2. As a result, the awardee did not need to recruit pharmacies in Year 2, and it does not plan to recruit for Year 3 because program leaders feel that the network is too big, and they would like to focus on stabilizing the current participating pharmacies. In addition, some of the more established Year 1 pharmacies had an influx of high-risk patients. The network growth, along with the Year 1 pharmacies "hitting their stride," helped to increase the number of patients receiving CIPAs with follow-up.

An unintended consequence of this growth was that the awardee had neither the staff nor the infrastructure to support the ongoing, hands-on technical assistance that some pharmacies—both new ones and the original ones—needed to manage the medications of high-risk patients who often remain on a pharmacy's attribution list for many months and who need to be followed and assessed continually. To address some of these growing pains, Community Care of North Carolina developed and launched the pharmacy locator app and associated website (cpesn.com) to ease distribution and accessibility of network documents, training materials, performance reports, attribution reports, and other program materials.

B. Implementation of the service delivery model

In the second year of the cooperative agreement, Community Care of North Carolina continued to build a better understanding of the implementation of its service delivery model in two ways: (1) by compiling lessons learned from high-performing pharmacies[4] and (2) by spending time in a wide range of pharmacies when providing training, one-on-one pharmacy support from awardee staff, and technical assistance related to workflow. In addition, the awardee leveraged HIT to expedite referrals by creating a pharmacy locator app. The awardee also worked with a pharmacy software vendor to integrate patients' risk scores into pharmacy records so that high-risk attributed patients could be identified easily. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into two categories.

- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

[4] High-performing pharmacies are so called because they have adjusted their workflow such that they can provide a higher level of enhanced services.

1. Implementation processes

Pharmacies that originally approached Community Care of North Carolina in Year 1 to join the CPESN are the ones that tend to be high performing. By visiting these pharmacies and assessing their workflow in Year 2 in collaboration with industrial engineers at North Carolina State University, Community Care of North Carolina learned that high performers have specific attributes that have facilitated the implementation of the service delivery model. For instance, these pharmacies communicate well with physicians, receive referrals on a regular basis, are willing to provide enhanced services without payment in exchange for the opportunity to "reinvent" the community pharmacy, and have adjusted their workflow to incrementally improve their delivery of care. In the second year of the program, these pharmacies, in the words of a program leader, "do all that very independently" and are "now the ones who are ready to take on the world"

> "They [pharmacies] need someone to come into the pharmacy with the change package, observe what they're doing, figure out how to implement the package, do 50 percent of the legwork for them. That's what they need. I mean, we didn't budget that way. We're not resourced that way. Certainly not to do it across 350 pharmacies."
>
> — *Program leader*

Community Care of North Carolina used what it learned from these pharmacies—and from pharmacies that it visited and that are not as far along—to develop a change package that will help a wide spectrum of pharmacies to implement the service delivery model. During the first program year, the awardee realized that pharmacies enter the network in various stages of readiness to make the workflow changes that are necessary to support the intervention. Program leadership also recognized that it would have been beneficial to conduct readiness assessments with pharmacies so that all parties understood the level of resources that would be needed for participation. At the time of this writing, there is still not a good system for sharing resources and materials with participating pharmacies that would have helped them to make these changes. The change package is intended to fill this void. It will give pharmacies at any stage of readiness the support they need to better implement the program's enhanced services.

Given the range of pharmacy readiness, the awardee provided pharmacies with one-on-one support from a Community Care of North Carolina pharmacy technician and pharmacist through a helpline and conducted site visits to help struggling pharmacies in the first year of the program. Some of the smaller, lower-resourced pharmacies have requested significant, on-site technical assistance to help them change workflow and other processes necessary for implementation. To better understand how high-performing pharmacies in the network manage their work, from traditional tasks such as billing and dispensing, to more clinical work with engaging patients, the awardee partnered with industrial engineers at North Carolina State University. The industrial engineers provided recommendations for improving the workflow at these pharmacies. As of June 2016, the team assessed three pharmacies and plans to assess six more this year. Pharmacies that participated in the assessment have been highly receptive to external feedback on improving their workflow.

> "We have to understand how pharmacies are actually doing work, in order to help them figure out how to deliver clinical services and where they have opportunities to do that."

The high-performing pharmacies are becoming known in the community. As a result, they are getting more and more referrals. This is a mixed blessing because more patients are getting enhanced services, but the spike in patronage has put a strain on the pharmacies' resources and staff. As their attribution panels continue to grow, these pharmacies are using several strategies to meet demand. First, they have created new workflow approaches to reach and communicate with more patients. Second, they are working with Pioneer Rx, a pharmacy management system vendor, to populate their monthly attribution list with risk scores for each patient. This upgrade will allow the pharmacies to access patients' risk scores as part of their normal workflow, which saves time and helps them provide targeted, enhanced services to the patients who need them. Before this improvement, the pharmacies had to access risk scores through an Excel-based report, which was outside of their prescription-dispensing workflow and therefore inefficient.

> "We've realized that, as we do a good job, we get more high-risk patients involved. As we get more high-risk patients, the demands of the job increase and we need to basically keep up with those workflow demands as well."
>
> *— Pharmacy owner*

Advancements in Community Care of North Carolina's health IT has been an important part of the program. In the second year of the program, the awardee helped some pharmacies gain access to EMR systems (hospital level data), which has helped link discharged patients to a pharmacy that provides enhanced services. The awardee also developed a pharmacy locator app and an associated website (cpesn.com) that providers and patients can use to locate pharmacies that are offering specific enhanced pharmacy services by zip code. Unfortunately, initial testing of the app showed that three to five features were not user ready, which delayed the launch of the app. The awardee refined the requirements for those features and released a modified version of the app in August 2016. Currently, the awardee is conducting user friendliness and deployment of an "admin site" that will allow pharmacies to access and update their own enhanced service profiles.

Also on the technology front, Community Care of North Carolina is moving beyond the initial PHARMACeHOME health IT platform and encouraging pharmacies to leverage technology in a broader sense. The awardee designed PHARMACeHOME to support its care management services as well as to allow pharmacists to document the activities involved in providing enhanced clinical services and submit this information for monthly payment. It was a way for the awardee to test the pharmacies' health IT capabilities. The majority of pharmacists and awardee leaders agree that PHARMACeHOME is clunky because it does not fit into the community pharmacies' workflows and is slow. However, this was the first platform through which pharmacies could access patient-level data, such as patient medical history, lab work, and hospital admissions and readmissions. As the program matures, the awardee believes that a measure of program success will be getting pharmacies out of PHARMACeHOME and into their existing pharmacy information systems to document patient engagement and follow-up in a care plan that they will send to the awardee for quality assurance and payment.

The inability to access complete Medicaid claims data or Medicare claims data and has hindered the implementation of the service delivery model because pharmacies do not have complete, timely medication history on participants. Without this information, pharmacists may not be able to accurately assess their patients' drug therapy problems or complete a CIPA. There

are two reasons why Community Care of North Carolina cannot access these data. First, despite being the repository for the state's Medicaid data, it only has access to the prescription fill histories of Medicaid and dually eligible patients' who get their prescriptions from CPESN pharmacies. Second, the awardee cannot access Medicare Part D claims and the data they can access has a 12 months lag, so Medicare patients are added to the attribution lists on (1) the basis of whether they meet the program's eligibility requirements and (2) a pharmacist's judgment that they need enhanced medication management. Community Care of North Carolina can access the fill histories of patients only if the vendor that supplied the medication management software to that a pharmacy shares the histories with the awardee. To address this and the other gaps in the medication history of Medicare patients, Community Care of North Carolina has laid out the following steps: 1) sign a data attestation with a vendor to share data; 2) vendor gives the awardee fill history for their Medicare and Medicaid dual patients; 3) awardee runs vendor's attribution with their risk stratification models; 4) awardee sends back the vendor's attribution for Medicare patients with risk scores. This process has led to an increase in the number of vendors that are sharing their Medicare data with pharmacies.

2. Organizational and external context

The combination of health care reform, value-based payment, and HCIA R2 funding provided the right context for implementing the CPESN. Because community pharmacies recognize that the traditional approach to serving the public cannot survive in the current environment, they are enthusiastic about new ways of working and do not require additional encouragement to see the benefits of providing enhanced services to patients. Program leaders believe that many pharmacies in the network would sustain the program beyond the end of the cooperative agreement even in the absence of funding because they have been looking for an opportunity to change the way community pharmacology is practiced. However, the climate for sustaining the CPESN is uncertain because of the timing and scope of Medicaid reform. North Carolina's Medicaid plan is on the cusp of change, which could threaten the existence of Community Care of North Carolina. Still, the awardee remains optimistic about Medicaid reform creating a ripe environment for advancing value-based care not only for pharmacists but for all providers. Even though CPESN has been built into the 1115 waiver application, one challenge will be bridging pharmacies between the end of the cooperative agreement and the enactment of Medicaid reform. Nevertheless, the leaders at Community Care of North Carolina believe that Medicaid reform could also open the door to payment change, which could make it easier to sustain the CPESN.

C. Development of the payment model

As it enters the final year of the cooperative agreement, Community Care of North Carolina will be moving from a combination of PBPM and encounter-based payments to a value- and risk-based model, which pays pharmacies based on their performance. Pharmacies will be reimbursed for providing ongoing care and care management (for example, identifying and following up on drug therapy problems), and they will also receive encounter-based payments. Table 2 provides one example of how pharmacies will be paid for drug therapy follow-up based on performance. The awardee is mindful of the fact that in order to prepare pharmacies for changes to the payment model, it has to ensure that enough pharmacies are able to provide enhanced services for high-risk patients. Community Care of North Carolina has gradually laid

the groundwork for this change by adjusting the payment model based on the lessons it has learned while implementing the CPESN.

Table 2. Community Care of North Carolina's pay-for-performance ratings and proposed tiered payments for drug therapy problem follow-up

Performance rating	Number of performance points achieved	Proposed PBPM for follow-up of drug therapy problems
High performing	8–11	$6.00
No action required	6–7	$4.00
Coaching needed	4–5	$2.00
Review for network inclusion	0–3	$0.00

Note: Pay-for-performance tier levels are subject to the input of CPESN's Payment Advisory Group and approval by Community Care of North Carolina.

DTP = drug therapy problem; PBPM = per beneficiary per month

In the second year of the program, the awardee gave each pharmacy a performance rating that will be used in the future to affect payment. High-performing pharmacies were designated from low ones based on a 10 point scale with components related to total cost of care, hospitalizations, and medication adherence. Pharmacies have the potential to receive one bonus point for superior performance in the total cost of care domain (Table 3). Pharmacies are rated on measures based on a benchmark set by their peer pharmacies over time.[5] After educating pharmacies on performance measures and distributing the initial performance rating reports, the awardee collected informal feedback from the pharmacies on their understanding of the reports and their initial ratings. Awardee leadership reported that they have not received negative feedback from pharmacies on their performance scores, even from pharmacies whose scores were not optimal. The awardee speculates that this is true because pharmacies believe that performance measures can have a positive impact on the health of their patients.

[5] For the three risk-adjusted measures (total cost of care, inpatient hospitalizations, ED visits), pharmacies are rated according to the benchmarks. For the three of the four adherence measures (adherence to antihypertensive, statin, and diabetes medications) pharmacies are rated on the basis of Medicare Star Rating benchmarks. For the remaining adherence measure, which was designed by the awardee, pharmacies are scored relative to peer pharmacies over time. This measure assesses pharmacies according to their patients' adherence to multiple chronic medications (that is, patients who were on four or more chronic medications, such as drugs for ADHD drugs) in the past 12 months; and patients had drug possession of the majority of their chronic medications (>=75%) in 80% or more days since the first prescription fill of each medication.

Table 3. Community Care of North Carolina performance measures and associated points

Performance measure	Possible points
Risk-adjusted total cost of care[a]	2
Risk-adjusted inpatient hospitalizations	2
Risk-adjusted ED visits	2
Adherence to antihypertensive medications (Medicare Star Measure)	1
Adherence to statin medications (Medicare Star Measure)	1
Adherence to diabetes medications (Medicare Star Measure)	1
CCNC patient-level adherence measure	1

Source: Awardee self-reported narrative for quarter 5 of the HCIA R2 cooperative agreement that was submitted to the implementation and monitoring contractor

[a]Pharmacies can score a bonus point for risk-adjusted total cost of care for superior performance.

ED = emergency department

Community Care of North Carolina used the release of the performance reports from before the program was launched to February 2015 and from the third quarter after the program was launched (September 2015 to November 2015) to begin testing how Year 1 and Year 2 pharmacies are motivated by the performance measures. The measures showed that an influx of high risk patients can cause the scores of high-performing pharmacies to plummet. Although these pharmacies are considered high-performing in terms of their workflow processes and clinical capacity, they deal with patients who have special, complex needs that require additional medication management. The performance of these pharmacies declined the most on the three risk-adjusted measures (total cost of care, inpatient hospitalizations, ED visits) because these measures cannot improve as a result of a pharmacy's enhanced medication services alone. For example, a high-risk, recently discharged patient may appear on a pharmacy's attribution list, and improving this patient's medication adherence and preventing readmission could involve several months on enhanced medication services and clinical support from outside providers such as care managers.

Community Care of North Carolina is adjusting its payment model to ensure that high-performing pharmacies with a growing high-risk patient population are motivated by their performance-based ratings to continuously improve their delivery of enhanced services. The awardee plans to give each pharmacy two ratings and will base payment on the higher rating. One rating will reflect how a pharmacy's performance compares to its peers, and the other will reflect the change in a pharmacy's performance over time for specific measures. This revised approach will measure both point-in-time performance and the change in performance over time.

Pharmacists appear to be buying into both the incentives and the alternative payment model as a whole. They appreciate the additional payment for the services they already provide to participants. As one pharmacist who realized that the pharmacy business model is changing said, "We're not getting paid for filling prescriptions like we used to be. Now, we've got to do a better job of doing more clinical work in order to actually make a big difference in our payment model as well." Although several pharmacists noted that many factors related to their patients' health are out of their control, some feel that their clinical expertise could influence medication

management and hospital admissions. Other pharmacists and pharmacy owners said that they are willing to continue providing enhanced services even without payment in Year 4 because they believe that the pharmacy industry will eventually shift to a pay-for-performance model.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our summary of the baseline characteristics of Medicare fee-for-service (FFS) beneficiaries who are participating in Community Care of North Carolina's program. We measured the characteristics during the 12 months before each beneficiary's enrollment in the intervention. Participants are enrolled monthly into the Community Care of North Carolina program through two methods: (1) the patient is attributed to the pharmacy (because the patient has one or more chronic medications filled by an intervention pharmacy and 80 percent or more of those medications are filled there in the previous 90 days) or (2) the pharmacist identifies and documents that the patient has a drug therapy problem (DTP). The majority of participants are enrolled passively through attribution to a CPESN pharmacy. For the purpose of our future impact evaluation, the treatment group will consist of individuals with Medicare FFS and Medicare Part D,[6] Medicaid, or both who were enrolled in Community Care of North Carolina's intervention. For this summary, we include all Medicare FFS beneficiaries, including those without Part D, to describe the baseline characteristics of all Medicare FFS patients who are potentially eligible for the treatment group. Due to lags in the receipt of Medicaid data, we were unable to present the baseline characteristics for the Medicaid treatment group in this report.

A. Baseline characteristics of the treatment group

Community Care of North Carolina began enrolling beneficiaries in March 2015. As of April 30, 2016, the awardee had enrolled 144,257 unique participants in the program by using one of the enrollment methods described above.[7] There were 57,158 Medicare participants and 94,163 Medicaid participants (33,686 individuals participated in both Medicare and Medicaid). The remaining 18 percent (26,622 individuals) either had other sources of health care coverage or they were uninsured; these participants were not included in our analysis. Fewer Medicare-only participants are enrolled in Community Care of North Carolina because pharmacy fill data are being used to identify attributed Medicare patients. Fill data are not available for all participating pharmacies.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will

[6] Because prescription data are only available for Medicare FFS beneficiaries with Part D, treatment group beneficiaries for the Medicare population only include Medicare Part D beneficiaries for consistency with the identification of the comparison group.

[7] For the analysis, participants were considered enrolled after they were first attributed to a participating pharmacy or were identified and documented as having a DTP by a pharmacist in a participating pharmacy.

therefore vary by participant. After we excluded patients who did not meet the above criteria, a total of 40,480 Medicare FFS participants were included in the analysis of baseline characteristics for this report.

The Medicare FFS beneficiaries who are participating in the Community Care of North Carolina program are a diverse group, based on demographic and health status characteristics (Table 4). More than two-fifths (41 percent) of beneficiaries are younger than 65, while 10 percent are older than 85. Participants were more likely to be female (62 percent). In addition, most participants were predominantly white (62 percent) or black (34 percent), which reflects the racial composition of the Medicare-Medicaid dual eligible and Medicare-only beneficiaries in North Carolina.[8] Compared with 16 percent of Medicare beneficiaries nationwide and 19 percent of Medicare beneficiaries in North Carolina,[9] 55 percent of participants were originally eligible for Medicare because of a disability. One percent of participants were entitled to Medicare because of end-stage renal disease (ESRD). Thus, Community Care of North Carolina is recruiting a population that generally has significant health care needs and high Medicare expenditures. More than 70 percent of participants are Medicare-Medicaid dual eligibles, a designation that signifies a high level of social need. Participants have a mean hierarchical condition categories (HCC) risk score of 1.47 (relative to a national mean risk score of 1.00), which indicates poorer health status and greater needs for care than the general Medicare FFS population.

[8] North Carolina's Medicare population is approximately 74 percent white and 20 percent black, while its dual eligible population is approximately 53 percent white and 36 percent black. See Kaiser Family Foundation analysis of the March 2015 Current Population Survey Annual Social and Economic Supplement and analysis of fiscal year 2011 MSIS and CMS-64 reports.

[9] See Kaiser Family Foundation, "Distribution of Medicare Beneficiaries by Eligibility Category in 2013." Available at http://kff.org/medicare/state-indicator/distribution-of-medicare-beneficiaries-by-eligibility-category-2/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

Table 4. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through April 30, 2016

	All participants (N = 40,480)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	16,673	41
65 to 74	12,205	30
75 to 84	7,746	19
85 and older	3,856	10
Gender		
Female	25,217	62
Male	15,263	38
Race		
White	25,108	62
Black	13,910	34
American Indian, Alaska Native, Asian/Pacific Island American, or other	933	2
Hispanic	336	0.83
Original reason for Medicare eligibility		
Old age and survivor's insurance	17,875	44
Disability insurance benefits	22,135	55
ESRD[a]	470	1
Hospice[b]	254	0.63
Medicare/Medicaid dual status, percent dual[b]	29,291	72
HCC score[c]		Statistic
Mean		1.47
25th percentile		0.69
Median		1.09
75th percentile		1.77

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of April 30, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as either the date on which the program started in a facility (for existing residents) or the date on which a beneficiary first became a resident during the program period. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

DTP = drug therapy problem; ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Consistent with the higher HCC score, participants had higher expenditures in the year prior to enrollment. In Table 5, we report baseline utilization and expenditure data for a common set of measures, including the four CMMI core measures. The Community Care of North Carolina program expects to reduce medical expenditures by reducing (1) emergency department (ED) visits, (2) complications from poor control of chronic conditions, (3) and crisis management among mentally ill (and medicated) patients. We examined baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $978 (relative to the North Carolina Medicare FFS beneficiary average of $719 in 2014).[10] The quarterly average PBPM ranged from $925 to $1,052. Average PBPM Medicare payments for acute inpatient services ($322), physician services ($258), and outpatient services ($195) were the largest drivers of the total cost of care. Quarterly expenditures for these services were relatively stable over time, although all average costs were higher in quarter 4 of the baseline year. Payments for acute inpatient services ranged from $302 to $357 PBPM; for physician services, from $249 to $267 PBPM; and for outpatient services, from $184 to $206 PBPM.

[10] Unless otherwise noted, national and state data in this paragraph is from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf. Accessed October 2016.

Table 5. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through April 30, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	40,480	39,037	39,736	40,465	40,480
Average Medicare expenditures PBPM[a]					
Total	978 (10)	925 (14)	939 (15)	990 (15)	1,052 (15)
Acute inpatient	322 (5)	306 (8)	302 (9)	320 (10)	357 (9)
Inpatient other[b]	49 (3)	48 (4)	48 (5)	47 (3)	53 (6)
Outpatient[c]	195 (3)	184 (3)	191 (4)	199 (4)	206 (4)
Physician services	258 (2)	250 (3)	249 (2)	264 (3)	267 (3)
Home health	43 (1)	41 (1)	42 (1)	45 (1)	46 (1)
Skilled nursing facility	60 (2)	55 (3)	60 (3)	64 (3)	62 (3)
Hospice	13 (1)	7 (1)	10 (1)	14 (1)	21 (1)
Durable medical equipment	37 (1)	35 (1)	37 (1)	38 (1)	39 (1)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	381 (5)	364 (8)	360 (7)	380 (7)	418 (8)
Outpatient ED visits	1,036 (12)	1,026 (17)	1,033 (16)	1,041 (16)	1,041 (15)
Observation stays	99 (2)	96 (3)	96 (3)	101 (3)	101 (3)
Primary care visits in any setting	7,791 (39)	7,584 (51)	7,649 (52)	7,811 (51)	8,099 (53)
Primary care visits in ambulatory settings	6,297 (28)	6,160 (36)	6,218 (36)	6,330 (36)	6,465 (36)
Specialist visits in any setting	9,169 (55)	9,079 (74)	9,006 (70)	9,237 (72)	9,337 (71)
Specialist visits in ambulatory settings	7,016 (39)	6,778 (48)	6,888 (48)	7,137 (48)	7,240 (47)

Table 5 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	22 (< 0.5)	7 (< 0.5)	7 (< 0.5)	8 (< 0.5)	8 (< 0.5)
Percentage with an outpatient ED visit[e]	41 (< 0.5)	16 (< 0.5)	17 (< 0.5)	17 (< 0.5)	17 (< 0.5)
Percentage with an observation stay[f]	8 (< 0.5)	2 (< 0.5)	2 (< 0.5)	2 (< 0.5)	2 (< 0.5)
Percentage with a 30-day readmission among all discharges	18 (< 0.5)	16 (1)	18 (1)	19 (1)	18 (1)
Percentage of participants with a readmission among all participants	4 (< 0.5)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of April 30, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

The rate of acute care hospitalizations was 381 per 1,000 Medicare FFS participants per year during the baseline year—higher than the North Carolina average in 2014 of 268 per 1,000 Medicare FFS beneficiaries.[11] Twenty-two percent of participants had at least one hospitalization during the year before enrollment. The percentage of discharges with a 30-day readmission among participants (18 percent per discharge) in the baseline year was the same as the North Carolina average in 2014 for Medicare beneficiaries (18 percent per discharge). The rate of outpatient ED visits (1,036 per 1,000 participants in the baseline year or 41 percent of participants) was more than double the 2013 national rate of 454 per 1,000 Medicare FFS beneficiaries.[12] The considerably higher rates of outpatient ED visits suggest that there is an opportunity to reduce use of outpatient ED visits through improved patient self-management and coordination across providers. The rate of ambulatory observation stays was 99 per 1,000 beneficiaries per year in the baseline year. Overall, observation stays at baseline were higher than the national average of 58 per 1,000 beneficiaries per year in 2014.[13] At baseline, the rate of primary care visits in any setting was 7,791 per 1,000 Medicare FFS beneficiaries per year. This rate falls to 6,297 per 1,000 Medicare FFS beneficiaries per year when restricted to ambulatory settings. The rate of specialty care service use in any setting was 9,169 per 1,000 Medicare FFS beneficiaries per year and the rate falls to 7,016 per 1,000 Medicare FFS beneficiaries per year when restricted to ambulatory settings. As with expenditures, utilization for most services are highest in quarter 4 of the baseline year. Overall, enrolled beneficiaries had higher expenditures, a higher rate of acute care hospitalizations, and a higher rate of outpatient ED visits relative to the national and North Carolina averages for all Medicare FFS beneficiaries—suggesting that there is potential to make improvements in care.

For the next quarterly report, we will report baseline information for the Medicare FFS evaluation treatment group by including only Medicare FFS beneficiaries with a Part D benefit. We will expand our reporting of baseline health status and utilization and expenditure characteristics. Because the program provides medication management to patients with chronic conditions, we will report on the prevalence of the most common chronic conditions among participating Medicare FFS beneficiaries.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee.

[11] Unless otherwise noted, national and state data in this paragraph is from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf. Accessed October 2016.

[12] National outpatient ED rate calculated from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf. Accessed August 2016.

[13] See the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf. Accessed August 2016.

Table 6 below provides an expanded set of evaluability criteria that goes beyond those discussed in Section IV.A. Our primary assessment of evaluability focused on three evaluability elements presented in Table 6: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 6. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Community Care of North Carolina

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	64,768
Projected Medicaid population with 6 months of program exposure	169,602
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,081
Likelihood of all-cause hospitalizations	2,599
MDE sample size requirement to detect 20% effect	
Total expenditures	770
Likelihood of all-cause hospitalizations	650
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA R2 award
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Intervention components delivered reflecting greater intensity of intervention

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact evaluation of the awardee's program by using difference-in-differences estimation with propensity score matched comparison groups of pharmacies for Medicare and Medicaid beneficiaries who received services from the treatment and comparison group pharmacies. However, due to attribution methodologies for the treatment group that require pharmacy data, analysis of program effects for Medicare patients will be limited to the approximately two-thirds of Medicare patients with Part D benefits. Challenges for the evaluation include the changing treatment status of pharmacies and the possible unobserved differences in capabilities between participating pharmacies and comparison group pharmacies. We have sufficient participation by Medicare and Medicaid beneficiaries to detect small effects (fewer than 10 percent) on Medicare and Medicaid expenditures.

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V. NEXT STEPS

A. Implementation evaluation

As Community Care of North Carolina enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During these interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next step in the impact evaluation includes identifying the following patients enrolled in Community Care of North Carolina's program: Medicare FFS with Part D, Medicaid-CHIP, and dually eligible patients. We hope to identify Medicaid patients from Medicaid claims data received from Community Care of North Carolina. After identifying treatment group patients in the Medicare and Medicaid FFS claims data, we will begin to produce initial baseline means at the pharmacy level of the characteristics of patients in the treatment group. We will use North Carolina Board of Pharmacy data, which include many pharmacy descriptors, to identify potential comparison pharmacies. We plan to use propensity score analysis to better align the characteristics of CPESN pharmacies (including relevant patient characteristics) with the characteristics of comparison group pharmacies. After constructing a matched comparison group, we will create our outcome and explanatory variables and produce impact estimates by using the difference-in-differences Bayesian method for the relevant quarters of program operations.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with Community Care of North Carolina.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include pharmacists, pharmacy technicians, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services, either directly or indirectly, from Community Care of North Carolina's program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.9.

CATHOLIC HEALTH INITIATIVES IOWA CORP., DBA MERCY MEDICAL CENTER–DES MOINES

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REPORT

APPENDIX B.9

HCIA Round Two Evaluation: Catholic Health Initiatives Iowa Corp., DBA Mercy Medical Center–Des Moines

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the program, Transitioning a Rural Health Network to Value-Based Care; the awardee's implementation experience during the first program year; and its progress toward its enrollment goal.[1] This year's update focuses on the progress of Catholic Health Initiatives Iowa Corp., doing business as Mercy Medical Center–Des Moines, in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Catholic Health Initiatives made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Catholic Health Initiatives and its implementing sites addressed the issues identified during the first program year? What factors have influenced the awardee's and its sites' ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Catholic Health Initiatives' Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Transitioning a Rural Health Network to Value-Based Care program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Catholic Health Initiatives is using funding from HCIA R2 to create the Transitioning a Rural Health Network to Value-Based Care program. Launched on September 1, 2014, the program provides care management for adults with one or more chronic diseases, including diabetes, hypertension, chronic obstructive pulmonary disease (COPD), and cardiovascular disease. Continuous quality improvement, a key focus of the program, is expected to reduce costs and improve operations. The explicit goals of the program are to (1) improve population health for those living with one or more chronic conditions, (2) improve linkages between clinical care and community-based resources, and (3) implement Lean operational improvement strategies to reduce spending.

The program involves numerous organizations and multiple levels of staff.

- Catholic Health Initiatives is the parent organization and the recipient of the cooperative agreement. Its subsidiaries include the Mercy Accountable Care Organization (Mercy ACO), which is a participant in the Medicare Shared Savings Program (MSSP), and the Mercy Health Network. The program leaders and ACO administrators are based in Des Moines, whereas the Mercy Health Network comprises facilities in three regions (North Iowa, Central Iowa, and Siouxland).
- Mercy ACO partnered with the rural hospitals affiliated with Mercy Health Network to implement the program. Regional staff support program implementation by working with the participating rural hospitals, which include 23 critical access hospitals (CAHs), one rural acute hospital (that does not have CAH designation), and two urban medical centers that have a primary clinic network. Each hospital has at least one affiliated local clinic.
- The awardee added health coaches and health coach assistants to the clinics and designated a "provider champion" for each group of clinics affiliated with each hospital to support program implementation at the local affiliated clinic(s). The health coaches and their assistants are employed by the clinics; however, Catholic Health Initiatives is using HCIA R2 funds to reimburse the clinics for a proportion of their salaries and other expenses.

The program's health coaches and their assistants provide care management at hospital-affiliated clinics by educating participants about their diseases, providing training in self-management, identifying gaps in care, and coordinating care. The health coaches use disease registries, lists of patients, or chart reviews to identify patients with at least one chronic condition. They also receive referrals from family practitioners (that is, the physicians, nurse practitioners, and physician assistants who see patients at the clinics). The health coaching, which is tailored to the goals set by each patient, typically involves an initial face-to-face meeting between the coach and the patient, followed by weekly check-in meetings by phone. The duration of the health coaching and frequency of meetings varies for each patient and may change depending on a patient's level of engagement and progress. The health coaches also work on developing partnerships with various community resources to better connect participants to resources in their rural communities, such as local public health agencies, transportation services, and food pantries.

Health information technology (IT) is an important component of the program. Health coaches and their assistants use software called TAVHealth to collect relevant data on participants, monitor participants and family practitioners, and ensure that community resources dovetail with the needs of participants. Mercy ACO is partnering with Innovaccer, a health care analytics vendor, to build data connectivity between the implementing sites and to develop a data warehouse (the Data Shop) and disease registry to support program monitoring and through which data for measuring program outcomes can be collected and stored.

To ensure ongoing quality improvement in the program among the dispersed hospitals and affiliated clinics, Catholic Health Initiatives uses performance excellence (PEx) facilitators, who follow Lean process improvement approaches to identify areas in which operations can be improved and costs can be lowered. The facilitators meet with health coaches and hospital administrators to present their ideas in these areas and to obtain buy-in, to work on standardizing care processes across the network, and to help clinics receive patient-centered medical home (PCMH) certification. PEx facilitators have led a number of projects to date, including projects that standardize health screenings and increase clinic accessibility. In terms of the payment model, Catholic Health Initiatives originally proposed expanding the shared savings model of the ACO to include participating rural hospitals; however, program leaders have revised the payment model in response to challenges.

Catholic Health Initiatives expects the program to affect all patients served by participating hospitals, which extends beyond patients who receive health coaching. The enrollment target is 100,000 participants. The awardee intends to reduce the cost of care, change health care utilization, and improve health.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Catholic Health Initiatives during the first year of its cooperative agreement.

- Buy-in from physician and hospital leaders was critical to the effective integration of the health coaches, and it was the catalyst for a culture of Lean process improvement at some of the sites.
- Regular meetings and communication between health coaches and between provider champions provided opportunities for continuous support and facilitated shared learning within and across sites.

We also identified several initial challenges in implementing the program and the strategies used by Catholic Health Initiatives to address them.

- Understanding the role of the health coaches and integrating them into the clinic workflow was difficult at some clinics. Anecdotal evidence and preliminary data showing the program's effect enhanced buy-in and helped family practitioners understand the role of health coaches and use them more effectively.
- Challenges involved in implementing health IT forced health coaches and assistants to mine data manually, which was time intensive; delays and accuracy issues with IT-supported data

aggregation impeded self-monitoring. A new health IT system was implemented to support data aggregation and program monitoring.

Finally, we identified several early lessons learned by Catholic Health Initiatives in implementing its program.

- Communication between program staff, clinic staff, and regional leaders (both one-on-one and as a group) was essential to implementing the program successfully.
- There is a substantial need for chronic disease management in the communities, and family practitioners came to realize that there are gaps in usual care.

C. Summary of findings in this annual report

In the second year of its cooperative agreement, Catholic Health Initiatives made progress in the following areas:

- The awardee has exceeded both its direct and indirect participant three-year enrollment targets.
- Nearly all program positions were filled, and the health coaching component was up and running by the end of Year 2; reaching these key milestones ensured that health coaches could be integrated into clinics' workflows and improve the quality of care.
- The awardee improved communication between leaders (such as program leaders, ACO leaders, and regional staff) and frontline staff (such as hospital administrators, clinic staff, health coaches and their assistants, and provider champions) by increasing the channels of communication and using peer-to-peer communication strategies to engage staff at all levels.
- The PEx facilitators have worked with site staff, hospital administrators, and each other to implement a range of process improvement initiatives across the three regions in order to standardize processes and increase efficiency in the clinics.

Over the past year, Catholic Health Initiatives did not make any major changes to the program, but it did make one minor change: the awardee clarified the role of the health coach and continued to refine the priorities for population health management in the participating rural hospitals and their affiliated clinics.

Below we note the key challenges that Catholic Health Initiatives has worked to address in the second year of its cooperative agreement, including data connectivity issues and other internal factors that have influenced the awardee's ability to address these challenges.

- Catholic Health Initiatives continues to struggle with establishing data connectivity between the clinics. Resulting delays and inaccurate data impeded several aspects of the program, including patient identification and self-monitoring, and created a barrier to staff engagement. The awardee is addressing these challenges by building a data warehouse and a disease registry that streamlines the data systems at each site, making them more compatible with each other and enabling them to provide real-time data. Catholic Health Initiatives launched a new registry during the eighth program quarter. Program staff are working

closely with the health coaches to identify any technology issues and questions, which they bring to huddles with Innovaccer and Mercy ACO's IT department.

- Program leaders continue to notice different levels of engagement and support among the administrators and leaders at participating hospitals. The revised communication strategies and the development of the new data warehouse and disease registry are expected to boost the level of engagement at these sites.
- Support for the program among family practitioners varies, and lack of their buy-in at some sites has limited the health coaches' ability to enroll potential participants. Provider champions continue to serve as key liaisons between awardee leaders and clinical staff, relaying program information to other family practitioners to strengthen their engagement.

As Catholic Health Initiatives enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- A major barrier to the awardee's originally proposed payment model is that shared savings through the MSSP is not compatible with the cost-based reimbursement structure of CAHs. Program leaders are removing the rural hospitals as participants in the Mercy ACO and are creating a separate ACO specific to the rural sites so that they can still participate in the MSSP. Program leaders will continue to work with technical assistance providers and CMS to develop a feasible payment model for the long term.
- Despite challenges posed by the payment model, the sustainability of key program roles—including health coaches and regional program staff—has been built into the program, and health coaching and Lean process improvement are expected to continue after the cooperative agreement ends.
- With regard to IT, the awardee will continue to develop the Data Shop platform. During the third program year, Catholic Health Initiatives hopes to have all sites connected; have admits, discharges, and transfer feeds connected to the Data Shop and to the Iowa Health Information Network; and integrate the care management function into the system.

Table 1. Catholic Health Initiatives: Transitioning a Rural Health Network to Value-Based Care characteristics at a glance

Program characteristic	Description
Purpose	The Transitioning a Rural Health Network to Value-Based Care program provides care management and navigation support for adults living with at least one chronic disease; it also links clinical and community resources. The participating sites use Lean process improvement to improve clinic and hospital operations and to reduce costs.
Components	• Care management: Health coaches educate patients about their disease, provide self-management training, assess gaps in care, coordinate care, and connect patients to community resources. • Quality improvement: Lean process tools are used to identify areas in which operations can be improved and costs can be lowered; PEx facilitators help to standardize care processes across the network. • Health IT: Software platforms are used to manage disease registries, monitor participants and family practitioners, and integrate community resources into the program.
Target population	Rural residents, primarily those with one or more chronic conditions; the initial focus was on individuals with diabetes, hypertension, COPD, and cardiovascular disease
Theory of change/theory of action	The awardee hypothesizes that care management, health IT, and process improvement initiatives will increase primary care utilization, raise vaccination and screening rates, reduce ED utilization, enhance links to community resources, improve participant and staff satisfaction, and improve the efficiency of clinic and hospital operations. These outputs will, in turn, lead to the outcomes of improved health, appropriate health care utilization, and reduced costs.
Payment model	Shared savings
Award amount	$10,170,496
Launch date[a]	09/01/2014
Setting	Rural hospitals (including critical access hospitals) and affiliated clinics
Market area	Rural
Market location	IA, NE
Outcomes	• Health outcomes: Improved population health as measured by CMS's 33 ACO quality measures • Health care utilization: Increased primary care utilization, reduced ED utilization for non-emergency conditions, and reduced preventable hospitalizations • Costs: A reduction in the total cost of care for participants

[a]After the initial planning period, the awardee's program began to operate as of this date.

ACO = accountable care organization; CMS = Centers for Medicare and Medicaid Services; COPD = chronic obstructive pulmonary disease; ED = emergency department; IT = information technology; PEx = performance excellence facilitator

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Catholic Health Initiatives in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during in-person interviews with program staff from July 11 through July 14, 2016, and additional telephone interviews with program staff through August 3, 2016. For the analyses of Catholic Health Initiatives' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct interviews with the following program staff:

- Two rural market managers
- Director of Data and Process Excellence
- Four health coaches and two health coach assistants
- Two PEx facilitators
- Four provider champions (including one regional rural medical director)

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews. The evaluation team also had informal discussions with the program manager and the post-acute care coordinator.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Catholic Health Initiatives' implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

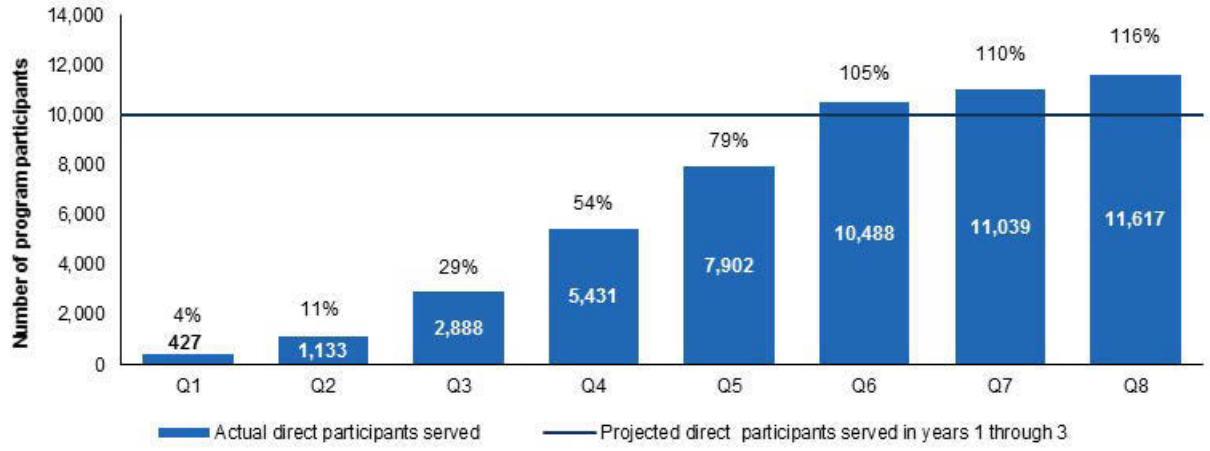
progress, including program changes. Given the number and diversity of the implementing sites, the facilitators and barriers described in the remainder of this narrative do not apply uniformly to all sites. The differences in their implementation experience stem from factors such as experience with population health, geographic location, and support from hospital leaders.

A. Program enrollment

Catholic Health Initiatives reported to the implementation and monitoring contactor that it directly enrolled 11,617 participants from September 2014 (the launch of its program) through August 2016, which represents about 116 percent of its 10,000 projected direct participants (Figure 1). Direct participants are those who receive health coaching services at one of the participating sites. The awardee indicated that it has exceeded its direct participant enrollment projection because the amount of time health coaches work with patients is shorter than expected, so the awardee was able to enroll more patients than originally anticipated. Catholic Health Initiatives also estimated that it indirectly served 197,556 participants from September 2014 through August 2016—nearly twice its projection of 100,000 indirect participants. Indirect participants are all patients served at participating clinics who are expected to receive better care as a result of the Lean process improvement component of the program. Catholic Health Initiatives indicated that at the time program leaders calculated the indirect enrollment projection (the fifth program quarter), the data warehouse was only pulling data from half of the participating clinics, which led them to underestimate projected enrollment. The baseline characteristics of participants whom we are able to identify in Medicare fee-for-service enrollment and claims data are presented in Section IV.

The program's stated target population is patients with at least one chronic condition; diabetes and hypertension are the main focus. In practice, however, the target population is somewhat broader and varies by site and region. For example, some clinics also focus on individuals who want to quit smoking, lose weight, or have other health care needs. In addition, those with other chronic conditions who have difficulty meeting the goals they have set for themselves or who are newly diagnosed may be enrolled. Clinics in Siouxland are focused particularly on enrolling individuals who have recently been discharged from a hospital and are at high risk for readmission.

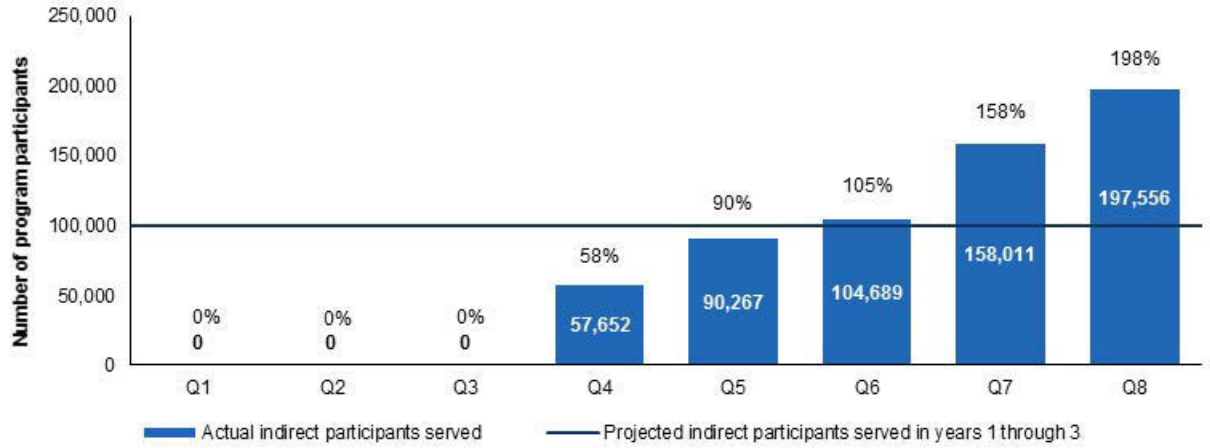
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter.

> "I definitely think when the doctor refers the patient, that's helpful. Getting into the office visit at that time and catching them while they're here is key because I think they're less inclined to answer the phone or call me back."
>
> *— Health coach*

Catholic Health Initiatives' progress in meeting its enrollment goals was influenced by several facilitators. First, obtaining referrals from family practitioners at the clinics has been a key strategy. Health coaches and provider champions reported that referrals were more likely to flow in when (1) the health coaches' pre-visit review of a chart indicates that a patient could benefit from health coaching, (2) there is a close relationship between health coaches and family practitioners, and (3) family practitioners see patients benefit from health coaching and recognize the need for care management. Second, health coaches have found that patients are more likely to enroll and engage in the program when they (1) are informed and knowledgeable about the program, (2) are approached when they are already at a clinic, and (3) feel that they need a health coach for their self-management. Third, some health coaches track and contact patients who are due for the Welcome to Medicare visit or the Annual Wellness Visit, which also identify patients with care management needs. Last, in Siouxland, a Lean process improvement event to improve the way in which hospitals document hospitalized patients' primary care providers facilitated enrollment because it enabled health coaches to follow up with these patients and enroll them in the program.

> "We really are looking forward to getting that data [from the disease registry], and it's been one of the major disappointments and disengaging factors, I think, for our critical access hospital leadership teams. We're working as hard as we can to get these data."
>
> *— Rural market manager*

Program staff identified a few noteworthy barriers to enrollment as well as strategies for addressing them. First, delays in establishing the disease registry have impeded the staff's ability to identify patients. One regional leader noted that the program's focus on hypertension and diabetes was largely driven by the clinics' ability to access these data and that once the new disease registry is available, the clinics will be able to review (and target) different clinical outcomes. In the meantime, some health coaches are using Excel to manually track gaps in care and clinical outcomes, but some family practitioners do not believe that these data are as valid as data from a disease registry because they are manually generated and may therefore have errors. The new disease registry, which was implemented during the eighth program quarter, is expected to help clinic staff see a complete picture of their patients' outcomes and to accept the need for care management. Second, family practitioners at each clinic differ in the extent to which they are willing to refer patients, and this affects how much time a health coach spends at a clinic and consequently the rate of enrollment. A final barrier to enrollment is a patient's interest in and ability to meet with a health coach. The coaches are addressing this challenge by being as flexible as possible and having meetings by phone if patients cannot meet in person.

B. Implementation of the service delivery model

Catholic Health Initiatives made progress in several areas during the second program year without making significant changes to its service delivery model:

- The awardee has defined the roles of program staff and has stationed health coaches at each group of primary clinics affiliated with each rural hospital.
- The awardee has implemented process improvement initiatives to make the clinics more efficient. As of the eighth program quarter (June to August 2016), more than 25 Lean projects to support population health were executed, and the number of PCMH-certified clinics increased from one to six.
- There have also been improvements in the infrastructure that supports communication between the awardee leaders and frontline staff; however, the level of engagement in the program continues to vary from one hospital and clinic to the next.
- The awardee continues to face challenges in establishing data connectivity between all clinics, which has contributed to the challenges involved in engaging sites, identifying patients, and self-monitoring.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Given the complexity of the program, staff consider filling all positions and getting the program up and running to be important milestones. Health coaches have been integrated into the clinic workflow, which has improved the quality of care. For example, health coaches (1) monitor hospital discharges so that the clinic can schedule follow-up appointments; (2) spend time educating patients when the family practitioners do not have time to do

> "It seems so simple, but we started this program at ground zero, so we had to do all of the hiring for the coaches and the navigators, and do all of the orientation. That seems like something that might not be that challenging, but it is because you're doing it at a pace to ramp up, to have a health coach and a navigator in a lot of our clinic sites, to make sure that they're comfortable with what they're doing and that they understand all of the innuendos of their job. Then to say a year and a half, two years into the program that all of our coaches are hitting their goals—I think that is a huge thing and something that we're very proud of."
>
> *— Rural market manager*

so; (3) examine charts before the patient arrives to flag overdue preventive services, which makes the entire visit more efficient and thorough; (4) obtain lab work before appointments so that the family practitioner can follow up on results; and (5) locate clinical and non-clinical resources to meet their patients' needs.

Many rural clinics are chronically understaffed, so adding staff—namely, health coaches and their assistants—has allowed the clinics to implement performance excellence activities, which may not have been possible without the program. PEx facilitators have helped to standardize processes, define the roles of clinic staff, and make clinic operations more efficient. One physician described how the clinic changed its scheduling protocols and increased the number of patients seen by 16 per week. In another clinic, the health coach worked with the physicians and the IT team to standardize a depression screening protocol.

Health coaches reported that health IT is a key part of the intervention. The TAVHealth software collects non-clinical but clinically relevant data on participants, monitors participants and family practitioners, and ensures that community resources (such as smoking cessation programs, meal delivery services, and transportation services) are congruent with the needs of participants. TAVHealth facilitates organization and monitors health coaches' progress by tracking health coaching activities and patients' appointments, and it allows coaches to set reminders for patient follow-up. However, some health coaches complain that TAVHealth causes extra work on top of other tracking systems and that most of the community resources in TAVHealth are situated in the urban centers and are not accessible to rural populations.

Misconceptions about PCMH certification have led to lower engagement among some clinic administrators. For example, even though Mercy ACO pays for some of the certification fee, administrators are concerned about the annual certification fee. PEx facilitators recognize that in order to more fully engage clinic administrators, they need more education about the financial benefits of PCMH certification.

2. Implementation processes

Program leaders and staff have reported that peer-to-peer communication has been key to engaging staff at all levels. For example, family practitioners accepted the program more readily as a result of the rural medical director acting as a liaison between them and the Mercy ACO. The rural medical director's background in family medicine and her visits to the rural clinics increased her credibility among rural clinicians and helped to bridge the gap between them and the ACO. Similarly, the rural market manager noted the importance of the rural medical director's support when she spoke in front of the family practitioners at the governance committee meetings. The PEx facilitators also feel that hospital CEOs view process improvement activities as originating from "corporate;" but they have found that having a hospital CEO describe the benefits of process improvements to his or her peers at monthly CEO meetings is an effective, powerful means of engagement.

> "When I talk about a project, I'll get up there and start the project off, and then I have the CEO or somebody that was from that hospital or clinic talk about it to them. They get each other. They just see me as somebody from corporate, and I'm here to help and support. When they hear one of their fellows that they respect give that message, I think it's much more powerful."
>
> *— PEx facilitator*

During the first program year, the lack of understanding of the roles of the health coach and provider champion was a widespread challenge. During the second program year, there were more varied perceptions about the clarity of these roles. Some health coaches feel that they are creating their role as they go and want more standards, whereas others reported making significant progress in defining their role. The rural market manager worked with health coaches to develop a list of priorities to guide health coaches' activities and mitigate clinic staff's uncertainty about program roles. Similarly, some provider champions were not sure about how to use what they learned in monthly meetings, whereas others shared their knowledge with their colleagues and helped their colleagues understand changes occurring at their clinics.

Program leaders continually evaluate and revise communication strategies in recognition of communication challenges. Better and more communication (by phone or in person) has improved engagement, but challenges remain. Strategies for communicating regularly include monthly meetings between health coaches and rural market managers; monthly meetings of health coaches, providers champions, and rural market managers; monthly Mercy ACO meetings, to which all staff are invited; weekly health coach huddles; regular meetings between hospital administrators and PEx facilitators; presentations to hospital and clinic administrators by the project director; and regular visits to the clinic sites by regional staff. The rural medical directors attend monthly ACO meetings and relay information to and from clinic staff and ACO leaders. One rural medical director reported that the ACO meetings help her understand why things are changing, which makes change easier to accept. Similarly, health coaches reported that monthly meetings, which begin with a reflection on progress in the previous month and include the opportunity to discuss challenges, are helpful. During the second program year, PEx facilitators from each region started working together more frequently and implemented a network-wide project portal; these activities have allowed them to share projects, receive updates from each other about regional Lean process events, communicate lessons learned in implementing process improvement, hone their skills, and support each other.

> "There are just some conversations that I, as a layperson, I can talk until I'm blue in the face. A physician could have the same conversation peer to peer, and it just goes extremely differently because they have that mutual respect and because they're colleagues. . . . We really appreciate the grant dollars that have gone toward the physician champions."
>
> *— Rural market manager*

Performance data (when available) have facilitated the engagement of family practitioners, which some program staff attribute to the competitive nature of these clinicians. However, a lack of data connectivity in some clinics remains a major barrier to staff engagement and self-monitoring activities. The program's previous disease registry produced incomplete and inaccurate data and prompted the transition to the Innovaccer platform, which was implemented at the end of the second program year. One rural market manager explained that two hospitals in one region had not seen any outcomes data, and she noted the "stark contrast" in staff engagement between sites with and without access to data. During the first program year, some family practitioners did not receive any data, while others received inaccurate data. Frontline staff reported that they are looking forward to using the new registry and anticipate that it will help them to identify and focus on priorities for population health management.

In the absence of comprehensive program data, staff are using other vehicles—such as daily huddles, manual data collection, and clinic observations—to monitor activities. For example, Mercy North Iowa uses a daily huddle to discuss the metrics they are working to improve. The PEx facilitators use metrics such as the third next available appointment and patient satisfaction to monitor clinic access, and they use metrics on inventory size to measure the reduction in waste. PEx facilitators also observed clinic activities in order to drive process improvements. For instance, the PEx facilitators spent a day shadowing nurses and family practitioners, listening to their preferences, and facilitating communication among clinic staff to identify inefficiencies in clinic operations. The PEx facilitators then compiled a list of possible process improvement projects that staff could choose to target.

3. Organizational and external context

Recognizing the evolving nature of health care has helped clinic staff to accept and implement the program. Family practitioners recognize that having flexible staff will help them adapt to inevitable changes. For example, by engaging in process improvements now, clinics will be better positioned to continue to optimize processes in the future. Family practitioners are also more accepting of changes when they see how the changes improve patient care. Resistance to change has been a barrier at some clinics. Among the less engaged clinics, health coaches often described family practitioners as "traditional" and of the opinion that value-based care is a temporary phase. Other practitioners feel that the program is an additional burden on their already busy schedule, or they do not want to relinquish tasks to health coaches.

The small community feel of rural sites has facilitated the health coaching model and improved communication between clinics and hospitals. The main primary care clinic is often on the same campus as the hospital, which enables health coaches to make contact with participants at discharge and supports communication between clinic and hospital staff. Many health coaches were already engaged in community organizations and known to community members, which helped them to identify community resources and gain credibility in the community. However, the rural setting poses some challenges. The community resources available to patients are scarce compared with those in an urban setting, but health coaches have made progress by attending community events and by working closely with social workers and hospital care coordinators to learn about community resources.

In small, resource-constrained clinics, competing priorities have continued to impede uptake of the program. Program leaders have found that in understaffed clinics, administrators would rather the health coach fill a gap in nursing than conduct health coaching or PEx activities. When clinics have limited staff (such as a single physician assistant), allocating half a day to a Lean event or to travel to a monthly meeting has an impact on operations. In addition, some clinics transitioned to electronic medical records (EMRs) when the program was first implemented; this change drained resources, diverted attention from the program, and sometimes took up the health coaches' time. Even when clinics are interested in PCMH or other PEx work, these activities are often lower priority. To lighten the burden on clinic resources, one region decided to focus PEx activities on one process that had a high potential for impact, thus helping to make this work a priority.

Inaccurate and delayed data have continued to prevent clinics from prioritizing health coaching and evaluating activities. For instance, the site-to-site variation in EMR systems has delayed efforts to establish data connectivity between sites. Outdated systems have made it difficult to mine data from rural sites, and some EMR vendors charge a fee to export data. A program leader described how the shared savings data have a six-month lag. In addition, program leaders do not think that vendors' analytics are transparent and therefore spent time trying to reproduce the metrics. Leaders are confident that the new Innovaccer system will streamline each site's systems to make them more compatible with systems across the network and provide real-time, actionable, accurate, and transparent data. The data will be used to create a report for health coaches and to build a family practitioner portal with a customized performance report.

Finally, rural health clinic (RHC) reimbursement policies can hinder efforts to promote Medicare annual wellness visits.[3] RHCs are not reimbursed for preventive services according to the Medicare physician fee schedule; instead, RHCs are paid an all-inclusive rate for preventive services that covers all preventive services provided on a single day. Therefore, clinics do not have a financial incentive to provide additional preventive services and are only reimbursed for annual wellness visits if the patient returns to the clinic on a separate day. If the patient were to return to the clinic on a separate day, RHCs would receive about $70 for the annual wellness visit under the all-inclusive rate. Reimbursement under the physician fee schedule for the annual wellness visit for non-RHCs is approximately $160. Several health coaches reported that it was challenging for patients to return to the clinic on a different day but that educating the patients about the importance of the visit helped to motivate them to return. The awardee reported that, despite some clinic staff reluctance to having the health coaches complete annual wellness visits (due to reimbursement and the belief that health coaches could be more productive elsewhere), completed wellness visits increased in the second program year. Additional challenges related to reimbursement are described in the next section.

C. Development of the payment model

Catholic Health Initiatives originally proposed expanding Mercy ACO's participation in the MSSP, which already included Mercy Health Network's urban sites, to include the rural hospitals in the program; however, as reported in the first annual report, program leaders have identified a major barrier to achieving shared savings in the rural market. The shared savings model is not compatible with the cost-based reimbursement structure of CAHs. The CAH designation minimizes the financial vulnerability of hospitals in rural communities so that residents of these communities have reliable access to hospital care. Medicare provides a cost-based

> "There's direct financial barriers as well in order to make these type of initiatives viable, which are huge initiatives when it comes to the Medicare Shared Savings Program to accurately depict risk of populations, accurately depict the disease burden, etc. I mean there's a lot of fundamental or foundational barriers associated with Medicare shared savings in particular and other arrangements in the value-based transition that are barriers to doing it in the rural. We're committed to continuing learning and identifying and bringing those issues up, given the geography here in the state."
>
> — *Program leader*

[3] This challenge only impacts the participating clinics that are certified by Medicare as RHCs. For more information on RHC certification, see https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/RuralHlthClinfctsht.pdf.

reimbursement to CAHs so that they can provide essential health care, which means that Medicare payments to CAHs are not based on the kind or the number of services that CAHs provide but on the cost of the CAHs and the proportion of the costs that are allotted to Medicare patients. Because of this reimbursement structure and the need to provide constant access in rural areas despite low patient volume, CAHs have disproportionally high fixed costs, which makes it difficult for them to achieve long-term savings by reducing utilization. Another barrier to the payment model is the variation in how providers are credentialed at the provider level or the facility level (depending upon how they bill), which has implications in terms of attribution from these facilities.

Program leaders have been working with technical assistance providers, engaging CMS, and using their experience to understand the unique financial challenges posed by the rural market and to identify strategies for addressing them. Program leaders decided to remove rural hospitals from the Mercy ACO and create a separate MSSP ACO specific to the rural sites before January 1, 2017, so that the system would be in place when the Medicare Access and CHIP Reauthorization Act of 2015 goes into effect. Creating a separate rural ACO will allow the CAHs to share lessons learned and participate in benchmarking with other entities that have similar payment structures. In addition, clinical integration groups will continue to provide a forum for rural practitioners to discuss best practices, challenges, and plans for the future. As of the eighth program quarter, all sites had agreed to participate in the rural ACO beginning in January 2017. The contract between the sites and the Mercy ACO requires that the sites maintain population health resources, which positions the program to be sustainable after the award ends. This change will allow the rural sites to continue to participate in Medicare shared savings and will give them a collective base without negatively affecting the urban sites in the Mercy ACO.

Despite ongoing challenges with the payment model, program leaders and staff noted that network leaders have a strong interest in risk-based contracts and population health management. A sizable amount of the population is already being served under risk-based contracts, and the network is, according to one rural market manager, “aggressively moving at a very fast pace to get to where we need to be to care for our patients in the best manner possible, and to be fiscally conservative under the ACO model.”

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

As previously described, Catholic Health Initiatives is implementing two overlapping interventions. One focuses on population health and health system improvement. All patients who seek care at participating clinics potentially benefit from this practice transformation component and are considered indirect program participants. The other component involves the direct provision of care management services through trained health coaches who are embedded in the clinics, usually on a part-time basis. Although all patients are eligible to receive health coaching services, the awardee initially encouraged participating clinics to target those with specific chronic conditions. Unlike the practice transformation component, patients are actively recruited into health coaching. Those patients who agree to meet with a health coach are enrolled in the program; they are considered direct program participants.

According to self-reported data, the awardee enrolled over 11,000 patients (16 percent above its three-year target) into health coaching during the first two years of the program. However, the awardee is unable to provide Medicare or Medicaid identification numbers for those who enroll in health coaching. As a result, we are attempting to identify them in Medicare and Medicaid enrollment files by using only their names and dates of birth—a challenging task with a high degree of inaccuracy that will take longer to complete. We are in the process of conducting the preliminary analysis, so we are unable to present the baseline characteristics for the treatment group for the health coaching intervention in this report.

A. Baseline characteristics of the treatment group

The baseline characteristics presented in this report are based solely on patients who may potentially benefit indirectly from the practice transformation component. Because indirect participants are not actively enrolled, we need to create a treatment group for this component. All Medicare beneficiaries who had a primary care visit at one of the 75 participating clinics (those affiliated with one of the 26 network hospitals) from September 2014 through May 2016 are eligible for inclusion in the treatment group. Using standard attribution rules and Medicare outpatient and professional claims data from September 2012 through May 2016, we identified 18,052 Medicare beneficiaries for whom a plurality of their primary care visits during the baseline period were at a participating clinic. Each individual's enrollment date is the date on which he or she first visited a participating clinic during the intervention period (after September 1, 2014). The baseline attribution period is the 24 consecutive months prior to that date. We have not yet identified the treatment group members for Medicaid because the data are available from the Medicaid Analytic eXtract only for the first few months of the program period.

In presenting baseline characteristics for indirect participants in the practice transformation component, we restricted the (attributed) treatment group to Medicare beneficiaries who were enrolled in Medicare fee-for-service (FFS), both Parts A and B, with Medicare as the primary payer when they became eligible for awardee-provided services (that is, their enrollment date) and who had met all evaluation criteria for a period of at least 90 days within the baseline year (the 365 days immediately before their enrollment). In addition, they had to enroll in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants.

As stated above, 18,052 attributed Medicare beneficiaries met the eligibility criteria and were included in the analysis of baseline characteristics for the practice transformation component. Table 2 displays their baseline demographic and health status characteristics. Slightly over half of the participants are 75 or older; only 10 percent are younger than 65. Most participants are female (59 percent) and white (98 percent). For the majority of participants (83 percent), age was the original reason for becoming eligible for Medicare. Seventeen percent of participants are dually eligible for Medicare and Medicaid. The average hierarchical condition categories (HCC) risk score for participants (1.1) is comparable to the average for Medicare FFS beneficiaries nationwide (1.05). More than half of the participants have HCC risk scores that are lower than the national average. The health status of program participants is therefore comparable to most Medicare FFS beneficiaries. Given that the treatment group members for the practice transformation component were attributed to participating clinics based solely on the clinic having the plurality of their primary care visits, it is not surprising that the health status for this population resembles the national average. (Direct participants of the health coaching intervention, who are recruited into the intervention based on need, are likely to have HCC risk scores higher than the national average.)

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 18,052)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	1,802	10
65 to 74	7,105	39
75 to 84	5,541	31
85 and older	3,604	20
Gender		
Female	10,589	59
Male	7,463	41
Race		
White	17,755	98
Black	42	0.23
American Indian, Alaska Native, Asian/Pacific Island American, or other	101	0.56
Hispanic	43	0.24
Original reason for Medicare eligibility		
Old age and survivor's insurance	14,997	83
Disability insurance benefits	3,003	17
End-stage renal disease (ESRD)[a]	52	0.29

Table 2 *(continued)*

Characteristics	All participants (N = 18,052)	
	Number	Percentage
Hospice[b]	72	0.4
Medicare/Medicaid dual status, percentage dual[b]	3,017	17
HCC score[c]		Statistic
Mean		1.05
25th percentile		0.47
Median		0.79
75th percentile		1.3

Source: Mathematica analysis of Medicare claims and enrollment data as of May 31, 2016.

Note: The treatment group for the practice transformation component includes indirect participants attributed to participating clinics based on the plurality of their primary care visits. The baseline year is defined as the 365 days before each beneficiary's enrollment date. Each individual's enrollment date is the date on which he or she first visited a participating clinic during the intervention period (after September 1, 2014). All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes indirect participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For indirect participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For indirect participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For indirect participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the indirect participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other indirect participants.

FFS = fee-for-service; HCC = hierarchical condition category

Members of the practice transformation treatment group also had low rates of service use and Medicare expenditures, on average, in the 365 days before enrollment. In Table 3, we report baseline utilization and expenditure data for a common set of measures. Through the combined impact of both components, Catholic Health Initiatives expects to reduce preventable hospitalizations by 12 percent and emergency department (ED) utilization for non-emergency visits by 30 percent. The awardee also expects to increase the use of primary care services by 30 percent. If the reductions in preventable hospitalizations and ED use are realized, the awardee anticipates a reduction in the total cost of care for participating rural communities by 2.08 percent for Medicare beneficiaries and 1.92 percent for dually eligible beneficiaries by the end of March 2017.

The baseline cost of care and the rate of acute care hospitalizations and ED visits were moderate for the large cross-section of Medicare beneficiaries attributed to participating clinics. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $509, roughly 36 percent below the 2014 national average for Medicare FFS beneficiaries of $792.[4] Average PBPM Medicare payments for acute inpatient

[4] The mean expenditure was drawn from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2015. Hospitalization rates were taken from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html.

($100), outpatient ($207), and physician ($107) services were the largest drivers of the total cost of care. The rate of acute care hospitalizations was 113 per 1,000 Medicare FFS beneficiaries per year during the baseline year, again far below the national average of 274 per 1,000 Medicare FFS beneficiaries in 2014. The rate of outpatient ED visits per year during the baseline year was 446 per 1,000 Medicare FFS beneficiaries.

The rate of specialist visits in any setting per year was 4,794 per 1,000 Medicare FFS beneficiaries during the baseline year, whereas the rate of specialist visits in ambulatory care settings per year was 4,169 per 1,000 Medicare FFS beneficiaries. The rate of primary care visits in any setting per year was 2,596 per 1,000 Medicare FFS beneficiaries, while the rate of primary care visits in ambulatory settings per year was 1,904 per 1,000 Medicare FFS beneficiaries. Somewhat surprisingly, given our attribution methodology (based on a plurality of primary care visits), the acute care and skilled nursing facility expenditures and the rates of acute care utilization and specialist visits in the quarter before enrollment were slightly higher than the rates of expenditures and utilization for the entire year.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	18,052	17,116	17,514	18,026	18,052
Average Medicare expenditures PBPM[a]					
Total	509 (8)	455 (13)	458 (11)	474 (12)	642 (17)
Acute inpatient	100 (4)	75 (6)	78 (6)	76 (6)	168 (9)
Inpatient other[b]	10 (1)	8 (4)	8 (2)	6 (2)	18 (3)
Outpatient[c]	207 (3)	204 (5)	203 (5)	207 (4)	213 (5)
Physician services	107 (2)	102 (3)	100 (2)	108 (2)	116 (2)
Home health	6 (<0.5)	7 (1)	6 (1)	6 (1)	7 (1)
Skilled nursing facility	50 (3)	33 (4)	38 (4)	39 (4)	88 (6)
Hospice	10 (1)	7 (1)	7 (1)	11 (2)	13 (2)
Durable medical equipment	20 (1)	20 (2)	17 (1)	21 (2)	20 (1)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	113 (3)	90 (6)	100 (5)	87 (5)	174 (7)
Outpatient ED visits	446 (9)	398 (13)	406 (12)	427 (13)	547 (14)
Observation stays	59 (2)	50 (4)	51 (4)	52 (4)	80 (5)
Primary care visits in any setting	2,596 (35)	2,670 (48)	2,817 (49)	2,572 (47)	2,328 (49)
Primary care visits in ambulatory settings	1,904 (26)	2,085 (34)	2,187 (35)	1,995 (34)	1,365 (28)
Specialist visits in any setting	4,794 (51)	4,603 (68)	4,566 (68)	4,795 (71)	5,179 (77)
Specialist visits in ambulatory settings	4,169 (43)	4,093 (56)	4,024 (54)	4,218 (59)	4,322 (56)
Measures of any health care utilization					
Percentage with a hospital admission[d]	8 (<0.5)	2 (<0.5)	2 (<0.5)	2 (<0.5)	4 (<0.5)
Percentage with an outpatient ED visit[e]	26 (<0.5)	8 (<0.5)	8 (<0.5)	8 (<0.5)	11 (<0.5)
Percentage with an observation stay[f]	5 (<0.5)	1 (<0.5)	1 (<0.5)	1 (<0.5)	2 (<0.5)
Percentage with a 30-day readmission among all discharges	11 (1)	12 (2)	13 (2)	11 (2)	11 (2)
Percentage of participants with a readmission among all participants	1 (<0.5)	0 (0)	0 (0)	0 (0)	0 (0)

Source: Mathematica analysis of information from Medicare claims and enrollment data as of May 31, 2016.

Notes: The treatment group for the practice transformation component includes indirect participants attributed to participating clinics based on the plurality of their primary care visits. The baseline year is the 365 days before each indirect participant's enrollment date. Each individual's enrollment date is the date on which he or she first visited a participating clinic for primary care during the intervention period (after September 1, 2014). Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

Table 3 *(continued)*

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each indirect participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Catholic Health Initiatives

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	23,210
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,484
Likelihood of all-cause hospitalizations	8,430
MDE sample size requirement to detect 20% effect	
Total expenditures	871
Likelihood of all-cause hospitalizations	2,108
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We plan to conduct a rigorous impact analysis of the CHIIC intervention. The comparison group will consist of beneficiaries who are patients at clinics located in Iowa and Nebraska that are not affiliated with Catholic Health Initiative.

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V. NEXT STEPS

A. Implementation evaluation

As Catholic Health Initiatives enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During these interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis as they pertain to the practice transformation component include the following:

1. Identifying a set of comparison group clinics
2. Identifying all Medicare and Medicaid beneficiaries who visit treatment and comparison group clinics and attributing those beneficiaries to the treatment or comparison groups based on the plurality of their primary care visits
3. Comparing the market-level, practice-level, and beneficiary-level characteristics at baseline across those two groups of clinics
4. Determining how well the groups match one another.

If there are no or few statistically significant differences between the treatment and comparison groups, we will produce initial impact estimates for the first one to two quarters of program operations (depending upon data availability) after creating our outcome and explanatory variables. If there are many statistically significant differences across the two groups, we will conduct a propensity score analysis to match CAHs to one another in order to better align baseline characteristics across the treatment and comparison groups.

The next steps in the impact analysis as they pertain to the health coaching component include the following:

1. Using the names and dates of birth of the direct participants who are enrolled in the program (as reported to us by the awardee) to try to identify the treatment group in the Medicare and Medicaid enrollment files
2. Identifying a set of matched Medicare and Medicaid beneficiaries at the same set of comparison clinics used in the practice transformation analysis (if the treatment group can be identified)

In the third annual report, we will expand our reporting of baseline utilization and expenditure characteristics for the practice transformation component to a comparison group of CAH-affiliated clinics located in the same regions of Iowa and Nebraska as the treatment group practices but that are not part of the Catholic Health Initiatives–Mercy network and are therefore not eligible to participate in the program. Depending upon our ability to identify the direct participants in the health coaching component by using their names and dates of birth, we will, in future reports, expand our analysis by examining utilization and expenditures for a subgroup of treatment group beneficiaries who visited health coaches at participating clinics compared with a matched comparison group.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include health coaches, health coach assistants, rural market managers, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include provider champions such as physicians, nurse practitioners, and physician assistants who see patients at the clinics and refer patients to the program. Rural medical directors, who serve as provider champions at their respective facility and oversee other physician champions in the region, are also eligible. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.10.

CHILDREN'S HOME SOCIETY OF FLORIDA

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MATHEMATICA Policy Research

REPORT

APPENDIX B.10

HCIA Round Two Evaluation: Children's Home Society of Florida

August, 2017

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CONTENTS

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Evans Community School, the Children's Home Society of Florida's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the awardee's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also discuss the awardee's progress in obtaining Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Children's Home Society made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the Children's Home Society and its partners addressed the issues identified during the first program year? What factors have influenced their ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of the Children's Home Society's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Children's Home Society of Florida's role in supporting the Evans Community School (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Children's Home Society of Florida, a nonprofit advocacy organization committed to protecting and supporting children and families, is using funding from HCIA R2 to support the Evans Community School by implementing a program with two primary components: (1) patient navigation and (2) direct services to individuals living in the community, including medical, dental, or behavioral health care services. The program was launched on October 1, 2014, and enrollment will continue through September 2017, for a projected total of 8,688 participants. The Children's Home Society considers an individual to be enrolled when he or she receives patient navigation or direct services. The awardee's partners include the following:

- Orange County Public Schools, the school system that operates the Evans Community School
- True Health (formerly the Central Florida Family Health Center), a private, nonprofit, federally qualified health center (FQHC) with several sites in the region that provide services through the primary care medical home (PCMH) model
- The University of Central Florida (UCF) Center for Community Partnerships, which links UCF resources with local initiatives to strengthen communities in central Florida

In 2012, the Children's Home Society and its partners transformed the Evans High School into the Evans Community School; the community school model brings together the school and other community resources to promote academic achievement, strong families, and a healthy community. This transformation involved, among other things, providing on-campus basic health and social services (for example, a school nurse and a food pantry) to students and their families. At about the same time, the Children's Home Society secured a grant through the Affordable Care Act to build a school-based FQHC, the Evans Wellness Cottage, on the Evans Community School campus. In addition, through a patient navigation pilot program (which later became a component in the awardee's service delivery model) outside of the Evans Community School, the awardee identified children ages 2 to 6 in the Pine Hills community who were covered by WellCare, a Medicaid managed care organization (MCO), and who had gaps in their use of primary care.

Through its cooperative agreement, the Children's Home Society built on the community school infrastructure and its partnerships to expand the patient navigation pilot program to the entire Pine Hills community. Although we focus on the awardee's use of HCIA R2 funding to support patient navigation and direct services provided by its staff, HCIA R2 is just one of several funding streams that support the activities offered through the Evans Community School and the Evans Wellness Cottage.[2] Each funding stream is necessary to achieve the awardee's goals, and it is not possible to clearly define the impact of a single stream. This means that although the Children's Home Society is using HCIA R2 funding primarily to support the

[2] Although not funded by HCIA R2, the Evans Wellness Cottage, operated by True Health, is a freestanding mobile home at the back of the Evans Community School campus. Central to the community school model, the Cottage is designed to interact directly with the patient navigation and behavioral health services supported by HCIA R2.

salaries of Children's Home Society employees, these services lead to activities that benefit multiple aspects of the program.

Through HCIA R2 and other funding, the Children's Home Society now offers patient navigation services at two locations: (1) the Evans Community School, in an area of the main building known as the Hub, and (2) the Pine Hills Wellness Office, which is a mile away from the school. Patient navigators at the Hub see students and community members on campus and connect them to a variety of health and social services, including housing supports, employment supports, food pantries, child care, and services that connect individuals to health insurance. Patient navigators who work out of the Pine Hills Wellness Office do outreach throughout the community, connecting individuals to the same types of services as do the navigators at the Hub. The second program component, direct service provision, is provided at the Hub. Here, Children's Home Society employees provide behavioral health services to Evans Community School students.

The awardee also uses HCIA R2 funding to sponsor an optional, weekly, after-school education program called the Student Ambassadors. Every week, students learn about a different health topic, and throughout the year, they go on several field trips (for example, to a hospital or medical school).

In addition, the Children's Home Society initially maintained its collaboration with WellCare after the full program was launched. WellCare continued to give the awardee lists of beneficiaries who had gaps in their primary care, and the two organizations initially worked together to develop a concept for the proposed payment model. The model included a capitated per beneficiary per month (PBPM) payment to the Evans Wellness Cottage for every WellCare member enrolled in the Cottage, along with shared savings between WellCare and True Health based on performance on quality measures.

Overall, the Children's Home Society expects that patient navigation and direct services will lead to lower costs of care, better use of appropriate health care services, and improved outcomes for patients (for additional program details, see Table 1).

Table 1. Children's Home Society of Florida: Evan's Community School characteristics at a glance

Program characteristic	Description
Purpose	The Children's Home Society of Florida (CHS) received HCIA R2 funding to implement a multi-pronged program intended to improve access to health care for individuals living in Pine Hills, FL.
Components	• Patient navigation • Direct services
Target population	All residents of Pine Hills, FL
Theory of change/theory of action	CHS hypothesizes that implementing a program that incorporates patient navigation and direct services for the Pine Hills community will lead to lower cost of care, better use of appropriate services, and enhanced patient outcomes.
Payment model	Value-based payments, shared savings, partial or full capitation for medical services
Award amount	$2,078,295
Launch date[a]	10/1/2014[b]
Setting	Evans Community School
Market area	Urban
Market location	Zip code 32808 in Pine Hills, FL
Outcomes	• Number of emergency department (ED) visits per beneficiary • Percentage of Medicaid/CHIP population receiving timely health care • Quality of the patient's experience with care • Percentage of female participants younger than 18 who are pregnant • Percentage of youth enrolled at Evans Community School who report risky health behaviors • Cost of care • Percentage of participants with asthma who have one or more ED visits

[a]After the initial planning period, the awardee's program began to operate as of this date.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Children's Home Society during the first year of its cooperative agreement.

- Since its opening in December 2014, the Evans Wellness Cottage has provided medical, dental, and behavioral health services to both students and the community in Pine Hills, Florida. By locating the Cottage on the Evans Community School campus across the street from a public bus depot, the awardee anticipated that students and community members would have direct access to a range of services.
- HCIA R2 funding enabled the Children's Home Society to expand its existing patient navigation pilot program, which originally targeted children ages 2 to 6 who did not have a primary care provider or who were overdue for a primary care visit. At the time of our first site visit, program staff were coordinating services for the entire Pine Hills community.

We also identified several initial challenges in implementing the program and the Children's Home Society's strategies for addressing them.

- Aligning the priorities of the multiple organizations that support the program was a challenge. To address this, True Health hired an Evans Community School liaison, who was a key facilitator of the effective partnership between True Health, Orange County Public Schools, and the Children's Home Society. In addition, the liaison helped to boost the students' service utilization at the Evan Wellness Cottage through continued outreach and education at the Evans Community School.
- The Children's Home Society and True Health staff struggled to gain the trust of the Pine Hills community's predominantly low-income and large Haitian immigrant population. In response to the slow uptake by this community, staff from both organizations developed culturally appropriate outreach materials, including strategically placed billboards and local radio advertisements.

Finally, we identified several early lessons learned by the Children's Home Society in implementing its program.

- The Cottage's success depends on strong partnerships. Each partner must be flexible and committed to both the school and the community.
- Having an FQHC on a school campus is not enough to ensure that students, families, and community members will use the health services available to them. Careful planning and marketing that is specific to the target population is necessary to ensure the use of services.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Children's Home Society made progress in the following areas:

- From October 1, 2014, through August 2016, enrollment was lower than expected: the awardee enrolled 58 percent of its 8,688 total projected participants.
- The Children's Home Society has fully implemented the patient navigation and direct services, but the awardee is experiencing several critical barriers to carrying out the service delivery model. For instance, True Health has struggled to adapt its services at the Evans Wellness Cottage to support the needs of its two target populations, students and members of the Pine Hills community.
- The Children's Home Society is still in the early stages of developing its payment model. To date, the awardee has developed the concept for the model, but it has not moved from to the design phase, nor has it gained buy-in from any Medicaid MCOs that would be able to implement the model.

Over the past year, the Children's Home Society also made several changes to its program:

- The awardee is seeking a new partner to provide medical and dental services because True Health has not had enough patient volume at the Evans Wellness Cottage to be financially viable.

- The Pine Hills Wellness Program has had to adjust to several staffing changes in the past year. Program leaders fired a few patient navigators and simultaneously absorbed staff from another Children's Home Society program that was discontinued. This program required staff to have at least a bachelor's degree, so the new patient navigators have more education than those who were replaced.

Below we note the key challenges that the Children's Home Society has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced its ability to address these challenges.

- Integrating True Health into the rest of the program was a challenge, largely because of a lack of communication. Because True Health is transitioning out of the Evans Wellness Cottage, the Children's Home Society is now focused on setting clear expectations about communication and collaboration with a new medical provider.
- Though administrators assumed that the convenient location of the Evans Wellness Cottage would promote service use, they are now finding that the Pine Hills community faces several barriers to accessing the Cottage. For instance, there is no direct route from the bus depot to the Cottage, so patients must walk through a dangerous neighborhood to access services. The Children's Home Society is exploring options for addressing this challenge, such as building an access road. At this point, however, accessing the Evans Wellness Cottage continues to be a challenge.

As the Children's Home Society enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee must demonstrate that the Pine Hills Wellness Program is reducing costs in order to gain buy-in from Medicaid MCOs to implement a new payment model. To date, the awardee has not been able to obtain the data necessary to demonstrate the impact of the program on costs. It plans to work with hospitals to obtain data but has yet to make contact.

  The Children's Home Society of Florida, in partnership with UCF, devotes considerable time and attention to developing strong partnerships within the Pine Hills community to ensure that the program will be sustainable moving forward. Thus far, the two organizations have successfully partnered with several community-based organizations within Pine Hills and the broader UCF community.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Children's Home Society in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 21 through June 24, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at the Children's Home Society
- Frontline staff
- Key implementation staff
- Key partners at True Health, Orange County Public Schools, and UCF

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

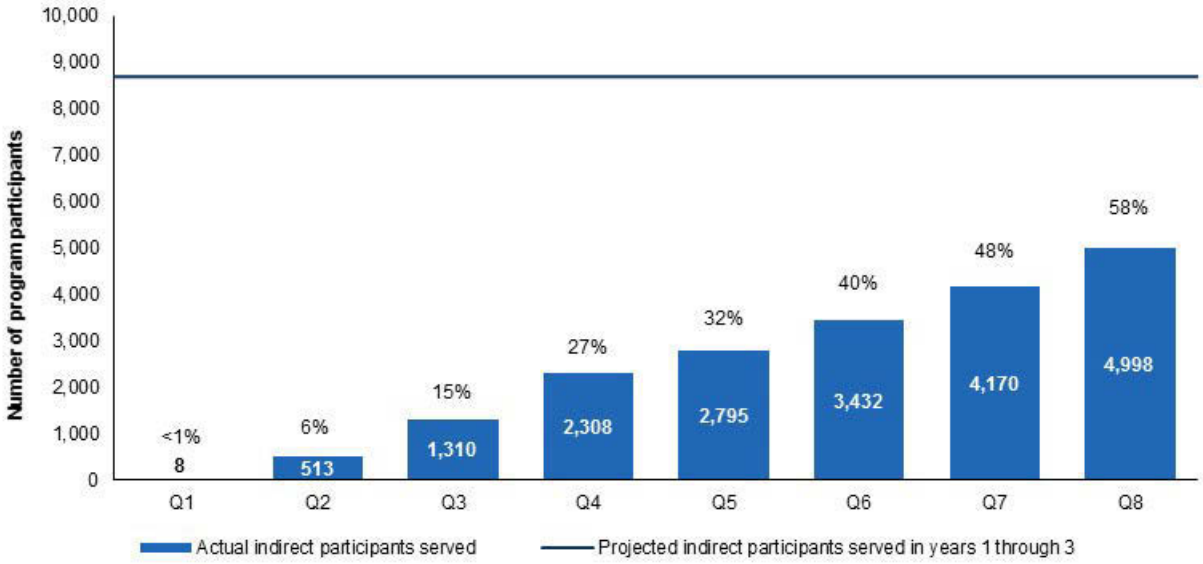
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the Children's Home Society's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the Children's Home Society reported to the implementation and monitoring contractor that it indirectly served 4,998 participants from October 2014 (the launch of its program) through August 2016, which represents about 58 percent of its 8,688 projected indirect participants (Figure 1). Interview respondents attributed this lower-than-expected enrollment primarily to challenges relating to the accessibility of the Evans Wellness Cottage, difficulty gaining the trust of the community, and a breakdown in the awardee's partnership with WellCare.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. CHS does not have direct program participants.

True Health has faced several barriers to enrolling enough patients to be financially viable and, as a result, it will be transitioning out of the Evans Wellness Cottage in January 2017. First, accessing the Evans Wellness Cottage is limited because there is no direct walking route from the bus depot across the street to the Cottage. Community members have to walk through an unsafe neighborhood to get there, and it can be difficult to find. The Children's Home Society will be working with the new provider to improve the signage for the Cottage, and it is considering seeking additional grant funding to provide transportation from the bus depot to the Cottage. Second, in order for True Health to be reimbursed by Medicaid MCOs, the nurse practitioner (NP) at the Cottage has to be listed as the patient's primary care provider. As a result, the Cottage will see only the Medicaid MCO beneficiaries whose designated primary care provider is the True Health NP (this restriction does not apply to privately insured or uninsured

patients). To overcome this barrier, True Health has worked with the Medicaid MCOs to waive this requirement, though only one MCO, AmeriGroup, has done so thus far. Third, although the financial viability of the Cottage could potentially be improved if True Health expanded the number of service providers or types of services provided, this is not an option because the Cottage is a small mobile structure that cannot be expanded.

The patient navigators in the Pine Hills Wellness Program continue to struggle with gaining the trust of the community. In the first year of the program, the patient navigators found that Pine Hills was a closed-off community, often distrustful of the organizations that work within the area. As a result, the Pine Hills Wellness Program struggled to enroll participants and refer community members to the Evans Wellness Cottage. In response, the Children Home Society of Florida organized several community events to lay the foundation for gaining the trust of community members, as well as community-based organizations. Program leaders believe that this is slowly happening. In the first year of HCIA R2, program leadership relied on targeted outreach by administrators and program's advisory council to develop external partnerships. At this point, the Children's Home Society's reputation is spreading within the community, and community-based organizations such as Goodwill Industries International, Inc. are reaching out to program leaders to develop partnerships.

Over the past year, the relationship between WellCare and the Children's Home Society waned, impeding enrollment in the Pine Hills Wellness Program. When the awardee launched the full program, WellCare gave the Pine Hills Wellness Program lists of patients so that the awardee could target its outreach to them. The two organizations also collaborated on the design of a new payment model. However, WellCare no longer sends lists to the Children's Home Society, hampering the awardee's outreach strategy. Program leaders are considering how to ramp up outreach activities without these lists, but a plan is not yet in place. In addition, the Children's Home Society is no longer working with WellCare to develop the concept for the payment model because of difficulties obtaining data. Consequently, the Children's Home Society plans to develop partnerships with local hospitals to acquire data. They plan to use this data to develop a business case for the new payment model.

B. Implementation of the service delivery model

The Children's Home Society of Florida has fully implemented both the patient navigation and direct services components of its service delivery model, but it continues to experience critical challenges. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- Intervention characteristics reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- Implementation processes are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- The organizational and external context comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates,

including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The Evans Wellness Cottage serves two target populations, which can sometimes pose logistical challenges for True Health. The Cottage targets students and teachers in the Evans Community School, as well as members of the Pine Hills community. Florida law mandates that community members pass a background check before coming into contact with students on public school grounds. Neither the Evans Community School nor True Health carry out background checks for patients, so the Cottage must have separate blocks of appointment hours for students and the community. Once the Cottage opened, program leaders found that the appointment hours for students were underutilized, whereas community members struggled to get an appointment. Furthermore, students wanted appointments early in the morning before school begins, and community members sought appointments in the evening after work. True Health adjusted the hours to better serve each population. Although utilization improved as a result, the Evans Wellness Cottage was restricted in the number of hours it could be open, which further compounded the problem. Ultimately, True Health could not cater to both populations, so its patient volume remains low.

2. Implementation processes

> "Evans has a high need for mentors in all shapes and sizes and formalities. To seek out volunteers, we meet often with UCF and other community organizations. We're piloting a summer program right now driven by UCF student organizations."
>
> *— Program partner*

The UCF Center for Community Partnerships has substantially facilitated the implementation of the Evans Community School. A large public research university, UCF has used its resources to support the Children's Home Society of Florida in several key ways. It has provided staff for several Hub programs (for instance, an after-school tutoring program), bolstering the school's capacity to provide services to students and families. In addition, UCF has helped to build the external partnerships that the Evans Community School relies on for program support.

In contrast, the Children's Home Society has had difficulty fully integrating True Health into the Evans Community School. For instance, staff from the Pine Hills Wellness Program noted that they have consistently struggled to get data that True Health collects on how patients heard about the Evans Wellness Cottage. (The patient navigators sought this data to assess the effectiveness of their outreach activities.) In addition, staff at the Orange County Public Schools and UCF stressed that they have struggled to communicate with True Health. They felt that True Health has not always been transparent, especially with regard to its financial problems. As the Children's Home Society

> "Communication was always lacking…we have a Communications Committee that I also sit on where we talk about marketing or websites that come out through the community school. True Health just hasn't been present on a phone call in months and months and months. That's always frustrating when [they're] saying their losing money, they have all these issues, but they're not coming to the table and really being a player to help us understand those issues and to come together to overcome them."
>
> *— Program partner*

considers new medical providers to take over at the Evans Wellness Cottage, it plans to set explicit expectations about communication and collaboration.

Finally, in the past year, the Children's Home Society implemented the Efforts to Outcomes (ETO) system, a new tracking system to facilitate self-monitoring. The ETO system allows a user to see all services delivered to a participant through the Pine Hills Wellness Program and the Hub. When the program was initially rolled out, implementation went smoothly for the Pine Hills Wellness Program. However, staff at the Hub struggled to integrate it into their workflow because of the additional administrative burden. As a result, the Children's Home Society hired a new staff member to assist patient navigators and behavioral health providers with data entry and to provide technical assistance. The position was only recently staffed, so we do not know the extent to which it is influencing implementation of the service delivery model.

3. Organizational and external context

Turnover has been heavy at the Pine Hills Wellness Program in the past year, making it difficult to provide patient navigation services to the community. The awardee had to replace three of the four patient navigators in a short time, and it did so with staff from the Youth Workforce Program, a Children's Home Society program that was recently discontinued. This program required staff to have at least a bachelor's degree, which is not a requirement for the Pine Hills Wellness Program, so the new patient navigators have more education than those who were replaced. At this point, the awardee is thinking through the best way to leverage this experience.

Leaders of the Children's Home Society and staff at the Hub have a strong, shared commitment to improving the lives of students at the Evans Community School. The Hub staff therefore feel as though they work well together as a team, and they have consistent support from program leaders. This shared commitment is evident to the students and to the school administrators, and it has had a positive influence on the climate at the Hub. In addition, it has helped to build a solid partnership between the Children's Home Society and Orange County Public Schools.

> "[The Pine Hills Wellness Program] slowed down just a little bit and then started focusing a lot on just relationship-building in the community, as far as building partnerships. That's been one of our major focuses so that we can make sure that we are making the right connections toward sustainability of our program."
>
> *— Program leadership*

The Pine Hills community, however, has a substantial need for many different kinds of behavioral health and social services, and it can be challenging to find partners that provide them. From year to year, the demand for certain services has been consistent; many community members need of employment support, assistance in finding housing, and crisis stabilization services. The Children's Home Society leverages other programs under its umbrella, and it developed a strong network of partnerships in the community to meet its service needs. Despite these efforts, there is greater need for services than there are service providers. This lack of capacity in the community is an obstacle for patient navigators at both the Pine Hills Wellness Program and the Hub.

The Children's Home Society sees strong partnerships with community organizations as a necessary component of sustainability. Awardee leaders have spent considerable time and energy building such partnerships with many organizations that provide services in Pine Hills, helping to ensure that the navigators can connect patients to the services that they need. In doing so, the Children's Home Society is also earning the trust of the community members, which program leadership believes will help to sustain the program.

C. Development of the payment model

The Children's Home Society is still in the early stages of developing its payment model. As described above, the awardee plans to implement a model that includes a capitated PBPM payment with shared savings for services rendered at the Cottage. In theory, the medical provider that replaces True Health will receive PBPM payments and potential shared savings from Medicaid MCOs and contract with the Children's Home Society to provide patient navigation services. Although program leaders have developed the concept for the model, they have not moved to the design phase, nor have they gained buy-in from any Medicaid MCOs.

The biggest barrier to developing the payment model has been lack of access to data. To gain buy-in from Medicaid MCOs, the Children's Home Society recognizes that it must demonstrate that participation works to an MCO's advantage. In other words, the awardee must demonstrate that the patient navigators are reducing costs to the MCOs by increasing the use of appropriate primary and preventive health services and decreasing unnecessary ED use. Program leaders originally focused on obtaining data directly from WellCare and other Medicaid MCOs to examine potential cost savings, but they were not successful. They are now focusing on obtaining data from local hospitals to assess whether ED use has changed for participants who receive services through the Evans Wellness Cottage, but they have yet to reach out to any hospitals.

IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Children's Home Society of Florida

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	0
Projected Medicaid population with 6 months of program exposure	Unable to project at this time due to lack of Medicaid data
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	4,582
Likelihood of all-cause hospitalizations	2,932
MDE sample size requirement to detect 20% effect	
Total expenditures	1,146
Likelihood of all-cause hospitalizations	733
Participation/Selection bias of concern	Yes, patient self-selection high or high refusal rate
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA R2
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Lack of timely Medicaid data by final report
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

It is unlikely that we will be able to conduct a rigorous impact evaluation due to a lack of Medicaid managed care data available in the Alpha-MAX Medicaid data for the state of Florida and receipt of only managed care organizations' patient identifiers, which do not allow us to link to Alpha-Max or the future T-MSIS Medicaid data. We are in discussion with a managed care organization (MCO) that has the largest share of the awardee's participants. If we are able to

negotiate claims data for the treatment group and a pool of insureds for our comparison group, we will reassess evaluability. If managed care encounter data are not available, we will not be conducting an impact analysis and will report only on the experiences of awardee staff and participants, based on our surveys.

V. NEXT STEPS

A. Implementation evaluation

As the Children's Home Society enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We cannot move forward with an impact evaluation unless we can obtain a timely source of Medicaid managed care data. Because we cannot link identifiers from the Children's Home Society finder file to identifiers in Alpha-MAX data, we have pursued Medicaid managed care data from an MCO instead. We recently submitted a draft data request to the MCO and are awaiting feedback. In the data request, we ask for pre-implementation and post-implementation eligibility and encounter data for both Children's Home Society program participants and members of a potential comparison group. If our collaboration with this MCO is successful, we would expect to receive MCO data in late fall 2017.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on staff members' implementation experiences and on their perceptions of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include patient navigators and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on participants' experiences in the program and on their perceptions of its effect on the delivery of care and health outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in May 2017.

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APPENDIX B.11.

CLIFFORD W. BEERS GUIDANCE CLINIC, INC.

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MATHEMATICA Policy Research

REPORT

APPENDIX B.11

HCIA Round Two Evaluation: Clifford W. Beers Guidance Clinic, Inc.

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Wraparound New Haven, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Clifford W. Beers Guidance Clinic, Inc.'s progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Clifford Beers Guidance Clinic made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the Clifford Beers Guidance Clinic addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Clifford Beers Guidance Clinic's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of Wraparound New Haven (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Clifford Beers Guidance Clinic, a community-based mental health clinic in Connecticut, received an HCIA R2 award to implement Wraparound New Haven (key program characteristics are noted in Table 1). Families enrolled in Wraparound New Haven are assigned to a care coordinator who works with them to manage and coordinate behavioral and physical health services and social supports. Wraparound New Haven serves Medicaid-enrolled children with complex physical and behavioral health needs as well as all members of the children's families who are interested in enrolling. Launched December 2, 2014, Wraparound New Haven's goal is to enroll 2,284 participants over the course of the three-year cooperative award.

Wraparound New Haven follows the wraparound care planning model, which emphasizes care that is family-driven, community-based, and well-coordinated.[2] Families are referred to Wraparound New Haven by local community providers and participate in the program for about 6 to 12 months. After a family enrolls in the program, Wraparound New Haven staff complete a series of assessments to identify families' needs and strengths. Care coordinators use the results as they work closely with families to develop and implement a care plan to address families' medical, behavioral, and social needs. Families review their care plan with their care coordinator at least once a month and make any necessary adjustments. Care coordinators also refer families to clinical and community-based services and supports, such as housing or employment assistance, and, with the family's permission, share the care plan with relevant providers. Wraparound New Haven's behavioral health clinicians also provide counseling to family members who need it until they secure a more permanent source of care.

The Clifford Beers Guidance Clinic initially proposed that the Connecticut Department of Social Services (DSS) would pay for Wraparound New Haven's services through a per-beneficiary-per-month payment model after the cooperative agreement period. DSS's shift toward innovative payment models has, however, prompted the awardee to consider other options, which include pursuing a value-based purchasing arrangement with DSS or directly marketing care coordination services to community providers and hospitals.

The awardee hypothesizes that families who work closely with a care coordinator will have a better understanding of how to manage their own health, determine the services they need, and find those services. This understanding will, in turn, bring about better mental and physical health outcomes and lower costs. Specifically, Wraparound New Haven strives to (1) improve the coordination of medical and behavioral health care, (2) enhance family engagement, (3) improve participants' physical and mental health status, (4) increase participants' social connections and social supports, and (5) reduce service fragmentation and the total cost of care.

[2] Bruns, E. J., Walker, J. S., and the National Wraparound Initiative Advisory Group. (2008). "Ten Principles of the Wraparound Process." In E. J. Bruns and J. S. Walker (Eds.), *The Resource Guide to Wraparound*. Portland, OR: National Wraparound Initiative, Research and Training Center for Family Support and Children's Mental Health.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Clifford Beers Guidance Clinic during the first year of its cooperative agreement.

- From the executive team at the Clifford Beers Guidance Clinic to the Wraparound New Haven care coordinators who work directly with children and families, staff at all levels shared a commitment to the program's success.
- Care coordinators gave high marks to the extensive training they received on the wraparound model.
- Care coordinators reported that families were engaged in the program and improving their ability to manage their behavioral, social, and medical needs.

We also identified several initial challenges in implementing the program and the Clifford Beers Guidance Clinic's strategies for addressing them.

- The program's enrollment numbers lagged behind expectations. The Clifford Beers Guidance Clinic worked to overcome this by expanding Wraparound New Haven's eligibility criteria, investing in key personnel to facilitate referrals, and strengthening relationships with referral partners.
- The Clifford Beers Guidance Clinic experienced significant challenges integrating physical and behavioral health care due to its limited experience in physical health care and the physical care providers' competing priorities and limited resources. The awardee hired a pediatrician to develop care coordinators' knowledge about physical health and facilitate their relationships with physical health providers.

Finally, we identified several early lessons learned by the Clifford Beers Guidance Clinic in implementing its program.

- The Clifford Beers Guidance Clinic found that integrating physical and behavioral health care required careful planning and an understanding of both provider settings.
- Program staff maintained a flexible approach in implementing Wraparound New Haven, and this allowed them to tackle implementation challenges as they emerged.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Clifford Beers Guidance Clinic made progress in the following areas:

- Achieved 58 percent of its three-year enrollment target for Wraparound New Haven.
- Continued to work closely with families to set goals and work to accomplish them**.**
- Began discussing a payment model for Wraparound New Haven with the DSS and provider organizations.

In the past year, the Clifford Beers Guidance Clinic also made several changes to its program:

- The awardee embedded a staff member at Yale New Haven Hospital, the program's main referral source, which helped increase enrollment in Wraparound New Haven.
- Care coordinators, who focused primarily on addressing participants' mental health and social service needs in the first program year, expanded their coordination of physical health services. To help accomplish this, the Clifford Beers Guidance Clinic hired additional medical staff to train and support care coordinators, fostered communication between care coordinators and participants' physical health providers, and partnered with a local organization to remove or alleviate the asthma triggers in participants' homes.
- The Clifford Beers Guidance Clinic enhanced its self-monitoring process to identify ways to improve Wraparound New Haven. Program staff identified the need for two program tracks, one for participants who have complex medical needs and one for those who do not.

Below we note the key challenges that the Clifford Beers Guidance Clinic has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Community providers continued to refer fewer families to the program than anticipated, and program leaders expanded their community outreach in response.
- As program staff sharpened their focus on physical health services, they occasionally deviated from the wraparound care model. For instance, care coordinators sometimes managed families' services for them instead of empowering families to do it themselves.
- Some program staff said they were overwhelmed by their jobs and did not get enough support from program leaders. Program leaders met with staff to find ways to alleviate these concerns.
- The Clifford Beers Guidance Clinic found it challenging to identify appropriate staff and community resources to address participants' needs. Program leaders partnered with local health care providers and state agencies to help fill service gaps.

As the Clifford Beers Guidance Clinic enters the final year of its cooperative agreement, it is anticipating the following challenges and successes.

- State budget shortfalls and Medicaid regulations may make it harder to establish a payment agreement with DSS in the final program year.
- Program leaders reported that the short evaluation period and evaluation delays could interfere with their ability to establish a business case for Wraparound New Haven.

Table 1. The Clifford Beers Guidance Clinic: Wraparound New Haven characteristics at a glance

Program characteristic	Description
Purpose	Wraparound New Haven connects eligible high-need children and their families to care coordinators to improve the management, coordination, and integration of behavioral and physical health services and social supports.
Components	• Care management services • Integrated behavioral and physical care services • Participant and family engagement • Health information technology
Target population	Wraparound New Haven provides services to an "index child" (a primary participant who meets the eligibility criteria) and to all members of the child's family who are interested in participating. The index child must: • Be a resident of Greater New Haven • Be no older than 17 • Be a current Medicaid beneficiary • Have at least one chronic medical diagnosis (broadly defined as any condition that consistently impacts a child's health status) and one mental health diagnosis or be living with, or under, conditions that tend to predict mental health issues • Have had either two or more visits to the emergency department or one medical, surgical, or psychiatric hospitalization during the prior 12 months
Theory of change/theory of action	The awardee hypothesizes that families working closely with a care coordinator will have a better understanding of how to manage their own health, determine the services they need, and find those services. This understanding will, in turn, result in improved mental and physical health outcomes as well as lower costs.
Payment model	Value-based payments, capitated payments
Award amount	$9,739,427
Launch date[a]	12/2/2014
Setting	• Community-based • Home-based
Market area	• Urban
Market location	• Greater New Haven, CT
Core outcomes	• Improve the coordination of medical and behavioral health care throughout multiple care settings • Enhance family engagement • Improve participants' physical and mental health status • Increase participants' social connections and social supports • Reduce service fragmentation and the cost of care

[a]After a planning period, the awardee's program began to operate as of this date.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Clifford Beers Guidance Clinic in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 7 through 14, 2016. For our analyses of the Clifford Beers Guidance Clinic's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Leaders of Wraparound New Haven
- Physical health staff
- Lead care coordinators
- Care coordinators
- Mental health clinicians
- Nurse embedded at Yale New Haven Hospital System

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

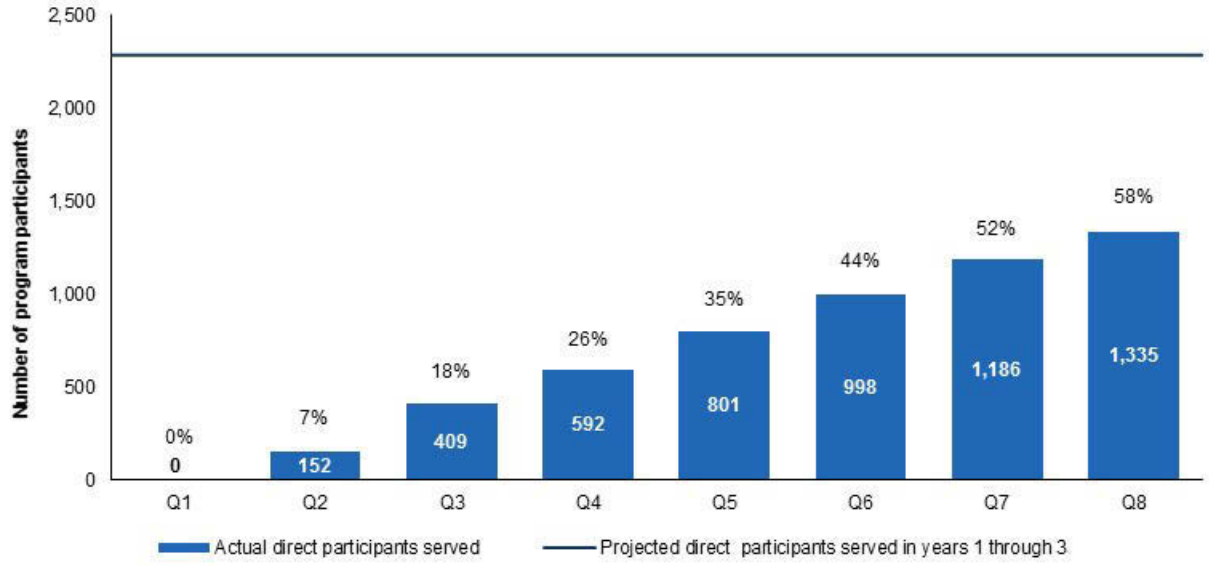
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the Clifford Beers Guidance Clinic's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the Clifford Beers Guidance Clinic reported to the implementation and monitoring contractor that it directly served 1,335 participants from December 2014 (when it launched its program) through August 2016, which represents about 58 percent of its 2,284 projected direct participants (Figure 1).

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Clifford Beers does not have indirect participants.

Clifford Beers Guidance Clinic made significant progress towards its three-year enrollment goal during the second program year. At the end of program year one, the Clifford Beers Guidance Clinic embedded a nurse at Yale New Haven Hospital, the program's main referral source, to identify potential participants and refer them to the program. Yale New Haven Hospital provided the nurse, as well as other Wraparound New Haven staff, access to the hospital's electronic medical record which enabled the nurse to identify which children seen in the clinic met the program's eligibility criteria. In addition, the nurse's presence reminded Yale New Haven Hospital providers about the program, and this increased the number of referrals they made to it. After identifying eligible children, the nurse met with their families to describe the program, gauge their interest, and determine if they were a better fit for Wraparound New Haven or for a less intensive care coordination program. The resulting spike in enrollment, however, may not be sustained. The nurse indicated that many of eligible children seen at the hospital have already been referred to the program, and the referral rate has started to decline.

In the second program year, other community providers referred far fewer participants to Wraparound New Haven than initially anticipated. Recognizing that the program may not meet its enrollment targets without referrals from providers other than Yale New Haven Hospital, the Clifford Beers Guidance Clinic continued provider outreach. Specifically, program staff presented on Wraparound New Haven at conferences and meetings of health care associations. Program staff also held one-on-one meetings with staff at health care provider or social service organizations.

Referred families enroll in Wraparound New Haven because they trust the Clifford Beers Guidance Clinic and see value in the program. The Clifford Beers Guidance Clinic has a reputation in the community as a trusted, reliable institution. Program staff report that families, some of whom reported negative experiences with formal supports, agree to hear more about the program because the Clifford Beers Guidance Clinic runs it. In addition, program staff reported that families enroll because they see value in a holistic program that addresses physical and mental health as well as social service needs for the entire family.

> "I do think people feel that sense of trust and, 'Okay, well we heard of Clifford Beers and we know it's a good place. Maybe you're not a program that's just coming in to take my kids away.' That's what I think a lot of people are fearful of when you say we have this home-based care coordination program. People are cautious."
>
> *— Program staff*

B. Implementation of the service delivery model

The Clifford Beers Guidance Clinic remains on track with the implementation of its service delivery model. Care coordinators continued to work closely with families to set goals and work to achieve them. Care coordinators typically met with participating families around three times a month in person and around two times over the telephone. As they did in the first program year, care coordinators worked with families to address mental health issues and social service needs (such as housing). In addition, program staff significantly increased their focus on addressing families' physical health needs. For example, the Clifford Beers Guidance Clinic partnered with an asthma program in the area to help families identify and address asthma triggers in their home.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The multigenerational aspect of Wraparound New Haven facilitates effective care management. Unlike other programs that focus on a single participant, Wraparound New Haven views families' needs as interconnected and coordinates services for the entire family unit. Program staff reported that this approach helps care coordinators and families identify stressors (such as homelessness) that are exacerbating children's health issues and collectively work to address them. For example, one family identified obtaining reliable transportation as a primary program goal, because without it, the parent found it difficult to obtain regular employment and to get the child to doctors' appointments.

However, it was challenging to integrate physical health care into the wraparound care model. Many Wraparound New Haven staff, program participants, and referral providers had never approached physical health coordination with the family-driven, strengths-based method outlined in the wraparound care planning model (which was designed to address social and behavioral health issues). This was part of the reason why program staff worked on few physical health goals with families during the first program year. Program staff did sharpen their focus on physical health services in the second year, but in doing so, they sometimes deviated from the wraparound care model. For instance, care coordinators sometimes managed families' services for them instead of empowering families to do it themselves.

> "Making that medical part of any program strength-based is always a challenge. . . . It's very hard to help people understand that they're in the driver's seat even when they have this chronic condition."
>
> — *Program staff*

2. Implementation processes

The Clifford Beers Guidance Clinic sharpened its focus on physical health services, most notably by hiring part-time medical staff to educate care coordinators on physical health care conditions and coordination. The newly hired staff included an internist, a nurse, and a pediatric fellow; they joined the pediatrician hired in the first program year. Medical staff educated care coordinators on common chronic conditions, encouraged them to broach physical health topics with families, and held regular and ad hoc meetings with care coordinators to discuss families' physical health goals. In addition, the medical staff reviewed participant's medical records to help care coordinators identify participants' health needs. The responsibility for contacting participants within 24 hours of an emergency department visit or discharge from the hospital was originally given to the care coordinators. Program leaders decided to have a nurse do this instead, because her training better prepared her to know participants' needs for follow-up care. Care coordinators said they valued these supports, though a few expressed the need for better access to medical staff to get their physical health-related questions answered more quickly.

In addition, program leaders employed new strategies to encourage and facilitate ongoing communication between care coordinators and physical health providers. For example, they programmed Wraparound New Haven's care coordination platform to give staff reminders on sharing care plans and assessment results with providers. Program staff also distributed monthly reports to providers, listing the patients that provider had in the program and their respective goals. As a result of these activities, there was an upward trend in the reported number of contacts care coordinators made with physical health providers throughout the second program

year. However, as in the first program year, care coordinators said providers seldom engaged in developing Wraparound New Haven care plans for participants.

The Clifford Beers Guidance Clinic formalized and expanded its self-monitoring processes. Supervisors started using a fidelity assessment tool to confirm whether care coordinators followed the wraparound care model while working with families. Supervisors also regularly distributed feedback reports to staff, comparing staff performance with benchmarks and flagging assessments and care plans that were past due. Program leaders used this information to adjust their program operations. For example, program staff recognized that providing the same level of service for all participants, regardless of need, was burdensome for both staff and participants. To resolve this, the staff created two medical tracks, one for participants who had complex medical needs (including all children who met the program's eligibility criteria as well as other family members who opted in), and one for those who did not. Participants in the comprehensive medical track receive more frequent assessments and chart reviews and more comprehensive care coordination services.

Some Wraparound New Haven staff said they felt overwhelmed because working with a high-needs population is emotionally taxing. Some care coordinators also reported their caseload (on average 10 families) was difficult to manage because they provide services for all members of the family as opposed to an individual. To moderate job stress, care coordinators and clinicians often supported and mentored one another.

> "My first three months [working for Wraparound New Haven] were pretty rough for me. I actually had to speak to [a colleague] a lot about some of the stuff that was going on at work. He had to help me realize that you can't bring it home and you can't save the world. You can only do what you can at that point in time. . . . [My colleague] has been a great outlet and easy to speak to and was able to help me transition into a better care coordinator."
>
> — *Program staff*

Several program staff reported that they also need more formal support. Care coordinators and clinicians recognized that program leaders strive to create a supportive environment, but some noted that program leaders were spread too thin to provide the support the staff needed. In the second program year, frustrations among staff were exacerbated by their low pay and the uncertainty about whether they would keep their jobs after the cooperative agreement period. A few staff were also frustrated with the formalized feedback process, saying that assessing them on quantitative outputs "boiled them down to just a number." Recognizing these challenges, program leaders held several group and individual meetings to reassure the staff and get feedback on how to support them better. In meetings, program staff suggested that the Clifford Beers Guidance Clinic enhance training, expedite care plan review, and expand access to supervisors during the third program year.

> "I think it would be helpful to have additional supports in the form of the supervisors or managers, because although they try very hard to make themselves available, we need to have more access to supervisors. [To fill the gap], care coordinators have grown over the past year to certainly support each other and try to answer questions."
>
> — *Program staff*

3. Organizational and external context

The Clifford Beers Guidance Clinic faced challenges hiring staff and identifying community resources needed to address participants' needs. Program leaders match families, to the extent possible, with care coordinators that reflect their culture, speak their language, and possess skills that match their goals. For example, program staff strive to pair families who are having trouble navigating the special education system with a care coordinator familiar with that system. Given participants' cultural diversity and wide-ranging needs, however, appropriately matching care coordinators and families was sometimes challenging. Most notably, the awardee could not identify and hire enough bilingual care coordinators to meet the needs of Arabic- and Spanish-speaking families. To help resolve this challenge, the awardee started partnering with Yale New Haven Hospital to provide interpreter services when needed.

The awardee also employed a partnering strategy to mitigate care coordination challenges that arose from a lack of resources in the community. Specifically, they said it was not easy to reduce use of the emergency department given the shortage of non-emergent after hours care in participants' communities. In addition, recent changes in how Connecticut prioritizes housing support services made it difficult for care coordinators to resolve participants' concerns about housing insecurity. The awardee worked with community agencies and local and state housing experts to expedite participants' referrals to housing services.

C. Development of the payment model

The Clifford Beers Guidance Clinic is in the early stages of developing a payment model for Wraparound New Haven. The awardee continued its discussions with DSS about funding Wraparound New Haven, but worried that state budget shortfalls and bureaucratic hurdles would make it hard to finalize a payment agreement. As a result, in the second program year, the Clifford Beers Guidance Clinic also focused attention on marketing Wraparound New Haven to provider organizations participating in value-based purchasing arrangements—including health systems, advanced practice networks, and independent practice associations. The awardee envisions that provider organizations will contract with it for intensive care coordination services as a way to reduce their own overall cost of care.

> "I think [demonstrating the business case for Wraparound New Haven] is a challenge because a lot of the gains that our program hopes to make for the family are not in the one-year time horizon. . . . Overall family stability, reduced toxic stress, these kinds of things are lifelong improvements for family functioning and for physical health as well as mental health. "
>
> — *Program staff*

However, program staff indicated that funding discussions with DSS and providers were limited by a lack of data on program outcomes. The awardee's evaluation of Wraparound New Haven was delayed because the necessary Medicaid data were received later than anticipated. Program staff planned to start Medicaid claims analysis by the end of the second program year. In addition, several staff raised concern that, even if the program demonstrates quality improvements, corresponding cost savings might not materialize during the three-year cooperative agreement.

IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Clifford Beers Guidance Clinic

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	537
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,649
Likelihood of all-cause hospitalizations	1,335
MDE sample size requirement to detect 20% effect	
Total expenditures	412
Likelihood of all-cause hospitalizations	334
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA-R2 award
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	No serious issues. Proceeding with comparison group selection
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	Awardee is administering their own surveys

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact analysis. We expect to identify a pool of potential comparison beneficiaries that consists of all Medicaid beneficiaries who meet the program's eligibility criteria but live in Hartford, Connecticut (outside the program's catchment area). From this pool, we will use propensity score matching to select a comparison group that is similar to the treatment group in terms of key characteristics and prior Medicaid service use. The sample size should be sufficient to detect plausible effects on claims-based outcomes.

V. NEXT STEPS

A. Implementation evaluation

As the Clifford Beers Guidance Clinic enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The awardee submitted a finder file in fall 2016 with state Medicaid identifiers. However, the identifiers they submitted cannot be linked to Alpha-Max or T-MSIS data, so baseline characteristics have not yet been analyzed. We are currently in communication with the awardee regarding whether they can supply additional identifiers (MSIS identifiers or social security numbers) to facilitate linking to the Medicaid claims data. Once we are able to identify participating Medicaid beneficiaries, we plan to analyze and report baseline characteristics. Then, we expect to identify a pool of potential comparison beneficiaries that is composed of all Medicaid beneficiaries who meet the program's eligibility criteria but live in Hartford, Connecticut (outside the program's catchment area). From this pool, we will use propensity score matching to select a comparison group that is similar to program participants in terms of key characteristics and prior Medicaid service use. Once we have enough Medicaid data to follow beneficiaries for at least six months past their enrollment date, we will estimate the impacts and report the results.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and participant outcomes. Examples of non-clinician staff include registered nurses, care coordinators, social workers, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and participant outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.12.

THE TRUSTEES OF COLUMBIA UNIVERSITY IN THE CITY OF NEW YORK

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REPORT

APPENDIX B.12

HCIA Round Two Evaluation: The Trustees of Columbia University in the City of New York

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the MySmileBuddy (MSB) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Trustees of Columbia University in the City of New York's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Columbia University made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Columbia University and its implementation partners addressed the issues identified during the first program year? What factors have influenced the awardee's and its partners' ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Columbia University's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the MSB program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Columbia University is using funding from HCIA R2 to develop and implement MSB, an intervention to prevent the progression of early childhood caries (ECC). Through MSB, community health workers (CHWs) meet regularly with parents or caregivers of young children with ECC over a period of 12 months to do the following: assess the children's risk for future caries; teach parents about these risks; set family goals with respect to children's oral health; evaluate progress toward the goals; and provide social support, toothbrushes, and toothpaste. A mobile, tablet-based application guides the CHWs' interactions with families. The application is designed to help CHWs and families plan, implement, and monitor positive oral health behaviors, including dietary control and the use of fluoride.

Columbia University is implementing MSB with support from multiple partners, including six hospital-based pediatric dental delivery systems (PDDSs) that identify eligible families and provide standard care, four community-based organizations (CBOs) that employ and supervise CHWs, and a technical assistance provider, Health Innovation Associates (HIA) that trains and supports the CHWs.

MSB targets the following individuals: (1) children ages 2 to 6 who have ECC and no comorbidities, and whose parents speak English or Spanish and are age 18 or older; (2) up to two eligible siblings of these children (that is, siblings in the same household younger than 6 [with caries if *older* than the index case, or with or without caries if *younger* than the index case]); and (3) the parents or caregivers of these children. The awardee expects to enroll 1,936 children in MSB by the end of the three-year cooperative agreement. Eligible children are identified by dentists at the partnering PDDS locations and during screenings conducted at Head Start child care centers and at community health fairs. The awardee gathers contact information for the parents of eligible children from the screening sites and then passes it on to CHWs, who contact the families to try to enroll them.

According to the awardee's theory of change, MSB will lead to the following outcomes: (1) changes in parent and CHW beliefs, attitudes, and self-efficacy with respect to children's oral health; (2) parental involvement in the development of goals and action plans with regard to their children's oral health; (3) improvements in parents' behaviors related to their children's oral health; (4) an increase in the percentage of children who demonstrate no new cavitations beyond what existed at the time of enrollment; and (5) reduced costs for treating ECC (because of a drop in the need for expensive surgery).

For its payment model, Columbia University originally considered developing a per beneficiary per month (PBPM) fee schedule to cover the CHWs' salaries and other costs. The awardee is now exploring several alternatives; the most promising approach thus far is to identify one or more Medicaid managed care organizations that would be interested in adopting MSB given the significant savings that the awardee is expecting the program to generate.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Columbia University during the first year of its cooperative agreement.

- Columbia University completed all of the preliminary steps necessary for the MSB program to be fully operational. The awardee signed subcontracts with partner organizations, obtained institutional review board (IRB) approval at all partner organizations, hired and trained CHWs, updated the MSB software, developed a new data management system, and modified the electronic medical records (EMRs) of its partnering PDDSs.
- With the support of the MSB technology, the CHWs' work has been fully compliant with caries science and with MSB policies and procedures.
- CHWs reported some early successes in bringing about behavior change among participating families.

We also identified several initial challenges in implementing the program and Columbia University's strategies for addressing them.

- Enrollment was significantly below projections because of delays in launching the program and fewer-than-expected referrals from partnering PDDSs and the Head Start screening program. The program team continually brainstormed and tried different strategies for enrolling more families. At the time the first annual report was written, it was too soon to tell how well these strategies were working.
- MSB's focus on disease management rather than on dental repair represents a paradigm shift for dentists, CHWs, and families; this change limited buy-in from all three groups. To address this problem, program leaders worked to educate dentists and CHWs, and in turn, CHWs worked to educate families about the value of a disease management approach.

Finally, we identified several early lessons learned by Columbia University in implementing its program.

- Even after a new technology system is developed and tested, changes to the underlying software may require extensive and costly updates.
- More time for planning and for program start-up would have been beneficial, especially to overcome the logistical challenges related to IRBs, data management, and subcontracts.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Columbia University made progress in the following areas:

- The awardee recruited 979 new participants, bringing the total number of participants to 1,102, or 57 percent of its enrollment target.
- CHWs continued to work directly with the families to enroll them and to provide oral health education and support.

- As part of its payment model and sustainability plan, Columbia University initiated a search for one or more Medicaid managed care organizations that would adopt and institutionalize MSB.

Over the past year, Columbia University also made several changes to its program:

- The software that CHWs use to log their interactions with participants, maintain their case notes, and submit this information to the awardee was changed.
- Columbia University started using tracking tools to monitor the enrollment efforts of PDDSs and CHWs.
- The awardee discontinued the subcontract it had with New York University (NYU) to serve as the point of contact with and the coordinator of the participating PDDSs. Columbia University assumed these roles and hired a dentist epidemiologist to collect and manage clinical data from the PDDSs.

Below we note the key challenges that Columbia University has worked to address in the second year of its cooperative agreement.

- Columbia University continued to receive fewer-than-anticipated referrals from the Head Start screening program and the PDDS sites. To increase enrollment, the awardee added recruitment sites, including a sixth PDDS (Bronx Lebanon), community health fairs, and a mobile health van.
- To address the low levels of referrals from the PDDS sites, Columbia University used several strategies to motivate dental residents to refer patients, including a newsletter, a day off if they made a specified number of referrals, and a presentation by the principal investigator (PI) explaining the rationale for MSB.
- Parents continued to be reluctant to enroll and participate fully in the program. To address this problem, the awardee encouraged dental residents to emphasize the program's value when referring parents, and CHWs continued to try to motivate parents and remove barriers to their participation (for example, by explaining the importance of preventive care and accommodating their schedules in finding times to meet).
- It has been difficult to collect clinical data from private dentists and to schedule 12-month follow-up appointments.

As Columbia University enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee expects Medicaid managed care organizations to be interested in adopting MSB given its potential to generate substantial savings.
- In the long term, Columbia University expects that changes in the larger payment policy environment will support the adoption of programs like MSB. For example, the awardee expects that dentists will increasingly be paid according to oral health outcomes rather than procedures performed, and that as this shift occurs, dentists will likely be more interested in paying for interventions like MSB that improve oral health outcomes.

Table 1. Columbia University: MSB characteristics at a glance

Program characteristic	Description
Purpose	CHWs, supported by a tablet-based mobile application, work with parents of young children to prevent the progression of ECC.
Components	• Patient and family engagement. CHWs work with parents or caregivers of young children with ECC to conduct risk assessments; provide dental education, toothbrushes, and toothpaste; and develop strategies to prevent the progression of ECC. • Health IT. CHWs use a mobile, tablet-based application to guide their interactions with families.
Target population	• Children ages 2 to 6 who have ECC and no comorbidities, and whose parents speak English or Spanish and are age 18 or older • Up to two eligible siblings of these children (that is, siblings in the same household younger than 6 [with caries if older than the index case, or with or without caries if younger than the index case]) • The parents or caregivers of these children
Theory of change/theory of action	Columbia hypothesizes that by educating parents and engaging them in goal setting (for example, cut back on sugary drinks) and in planning how to reach these goals (for example, buy less juice), MSB will lead to changes in the parents' behavior that reduce their children's ECC, thus diminishing the need for expensive surgery to treat ECC and thereby saving money and improving the children's oral health.
Payment model	Capitated payment
Award amount	$3,870,446
Launch date[a]	May 11, 2015
Setting	• Recruitment conducted at PDDS clinics, Head Start day care centers and community health fairs • Services delivered at participants' homes, locations in the community, or over the telephone
Market area	Urban
Market location	New York City
Core outcomes	• Increased access to dental care • Changes in the beliefs, attitudes, and self-efficacy of parents and CHWs • Development of parent-defined goals and action plans • Improvement in parents' self-reported behaviors • Percentage of children who demonstrate no new cavitations beyond what existed at the time of enrollment • Reduced costs of treating ECC

[a]After a planning period, the awardee's program became operational as of this date.

CHWs = clinical health workers; ECC = early childhood caries; PDDS = pediatric dental delivery systems

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Columbia University in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 21 through July 8, 2016. For the analyses of Columbia University's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct a total of eight telephone interviews with the following types of program staff:

- Columbia University program leaders
- NYU program leaders
- PDDS faculty members
- Dental residents
- CHWs
- CHW supervisors

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

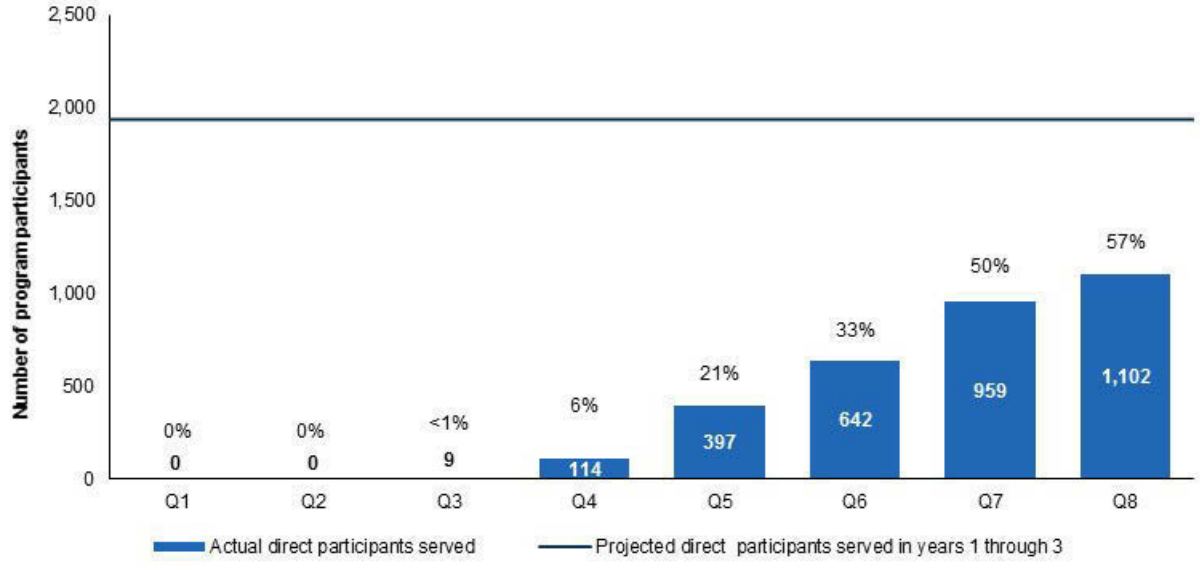
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Columbia University's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Columbia University reported to the implementation and monitoring contractor that it directly served 1,102 participants from May 2015 (the launch of its program) through August 2016, which represents about 57 percent of its 1,936 projected direct participants (Figure 1).

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Columbia does not have indirect program participants.

Interview respondents attributed lower-than-expected enrollment to three factors: (1) the proportion of children at Head Start child care centers involved in NYU's dental screening program who were eligible for MSB was lower than originally anticipated, (2) residents in PDDSs did not give high priority to referring eligible families to MSB, and (3) many families who were referred to MSB declined to participate. Each of these factors is described below along with Columbia University's attempts to overcome these challenges to enrollment.

The awardee anticipated that approximately half of MSB participants would come from dental screenings at Head Start centers, but enrollment from this source has been much lower than anticipated. To date, approximately one-fourth of participants have come from Head Start. NYU, which runs the Head Start screening program and produced the projections for enrollment targets, thinks that two factors contributed to its overestimate. First, NYU used New York state data, in which the percentage of Head Start children with caries is higher than what the awardee and its partners are finding in their city-based screening program. Second, the parents of many of the children who are identified as having caries follow up with a dentist who is not part of the MSB program, either because they cannot get an appointment at one of the PDDSs or because they already have a dentist whom they prefer to see.

Columbia University is working to overcome this referral and enrollment shortfall through several means. In Year 1, the awardee (1) expanded MSB eligibility criteria to certain siblings of eligible children, (2) tried several strategies to increase referrals from the PDDSs, and (3) added community health fairs as recruitment sites. In Year 2, the awardee tried some additional strategies to increase the number of children enrolled from PDDSs (described in more detail below) and added recruitment sites, including a sixth PDDS and its own mobile health van in which the awardee conducts screenings at Head Start centers that are not part of NYU's screening program.

Referrals from PDDS sites have also been lower than anticipated. As noted in the first annual report, dental residents have many demands on their time. As a result, they often do not have time to talk parents of eligible children about MSB, or they forget to mention it to them. In addition, some PDDS sites are so busy that they are finding it difficult to meet the needs of their existing patients, so they are not accepting many new patients. This limits the number of potential new recruits for MSB. Individual PDDS sites have continued to find unique ways to help residents make time and remember to mention the program. The sites have, for example, discussed MSB referrals during huddles, highlighted on the daily printed schedule of appointments the names of children who fall within the eligible age range, involved the front desk staff or volunteers in identifying potentially eligible children, and posted laminated flyers about MSB where residents and families can see them.

All PDDS sites also tried to motivate residents to make referrals by giving them a day off when they hit a certain number of referrals. This strategy was suggested by NYU. Interviewees said that this incentive seemed to increase the number of referrals for a while, but the effect then began to wane.

Columbia University is also using other strategies across all the PDDS sites to support recruitment. For example, when NYU was responsible for PDDS coordination, it began producing a newsletter for residents about MSB. The newsletter included CHWs' "stories from the field" to help the residents better understand how the program works and why it is valuable. To promote friendly competition and encourage referrals among PDDSs, the newsletter also presented the number of referrals overall and for each PDDS so that the residents at each site can see where their site stands in relation to the other sites. In addition, Columbia University created an MSB prescription pad that includes an MSB phone number for families to call if they are interested in the program. If residents do not have time to talk with families about the program, they can tear off a sheet from the pad and give it to families.

> "That presentation was very impactful and turned around the way the residents look at the whole program. I think ever since then we've been very proactive about signing up our patients."
>
> — *Resident*

More recently, the PI, sometimes accompanied by one or more CHWs, has been making presentations to the residents at each PDDS to help them better understand the underlying rationale for the program. The presentations were intended to strengthen the residents' motivation in two ways. First, the PI led the residents through an exercise to identify for themselves the problems with a surgical approach to treating tooth decay and to think through how practice could become more effective at combatting the disease. The problem identified by residents was that surgery does not stop the ECC disease process, so children often need dental

repair again and again. To break this cycle, parents should change the way they deal with their children's oral health; that said, dentists are not in a good position to give parents the support they need to make these changes. The residents ended up deciding that the solution to the problem would be to have someone from the community provide this support to the families—which is exactly what MSB does. The exercise helped the residents to see the big picture behind MSB and to understand the rationale for having CHWs work with families.

The second way in which the PI's presentations were intended to strengthen the residents' motivation to refer families to the program was by making the case that value-based purchasing is the future of dentistry and that the disease-management approach is likely to be the model of care for most of their careers. Dentists are now paid for procedures they perform, not for improving oral health, so they have an incentive to perform procedures, not to educate their patients about preventive dental care. If payers begin to use a value-based purchasing model in which they will pay for oral health outcomes instead of procedures, dentists will need interventions like MSB that support disease management. One resident reported that the PI's presentation was motivational, and she thinks that residents have been more proactive in recruiting for MSB since hearing it.

> "I think it's a huge challenge . . . the current thinking about oral health. To get the greater public to really understand that, yes, there's something you can do to prevent cavities. . . . That going to the dentist is a 'Band-Aid solution,' that it doesn't actually stop the disease from happening again."
>
> — *Program leader*

In addition to low rates of referrals from the Head Start screening program and PDDS sites, enrollment is lower than expected because a large proportion of families referred to the program ultimately decline to participate. Interviewees reiterated that a major barrier to enrollment is that oral health is not a high priority for most families, who tend to feel that if they have their children's cavities filled, they are doing all they need to do.

Another constraint on participation is that many families feel that they are too busy for the program or they are only available on the weekends (CHWs work only during the week). In addition, some families for which the CHWs receive referrals turn out not to be eligible, or they do not speak English or Spanish well enough to participate. For families that are eligible, CHWs try to persuade them to enroll by helping them understand the value of the program; CHWs also try to accommodate the families' schedules. Some interviewees commented that CHWs are particularly effective at doing this because they are "of the community" and can therefore relate to the parents. The free toothbrushes and toothpaste that families receive every three months also motivate them to participate. A CHW noted that some parents are simply motivated to learn and want to help their children.

The CHWs have also found that what the residents tell the parents about MSB affects the parents' willingness to enroll. If residents explain the program and tell parents that they think it would be valuable for them to enroll, for example, the parents are much more receptive when the CHWs call to enroll them than if the residents simply handed the parents a flyer or a prescription. The PI's efforts to increase the residents' understanding of and buy-in to MSB may therefore help to boost not only the number of referrals but also the proportion of referred families that actually enroll if residents are inspired to pitch the program more enthusiastically.

B. Implementation of the service delivery model

Except for the shortfalls in enrollment, the MSB program was implemented largely on schedule during the second program year. The only significant change that Columbia University made to its service delivery model was to discontinue its subcontract with NYU and assume the responsibilities of coordinating with the PDDSs. CHWs continued to work to enroll families in the program and to support them in improving their oral health behaviors.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into two categories:

- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Implementation processes

The challenges that Columbia University has faced in implementing its service delivery model are related to the collection of both clinical data on participating children and administrative data from its partner organizations.

The awardee collects clinical data on children at the time of enrollment (baseline) and at follow-up (12 months later). These efforts have been difficult for two reasons. First, as described above, many families recruited from Head Start follow up with their own private dentists, who are not involved in the program. Families have done this because they could not get an appointment at one of the PDDSs or because they prefer to see a private provider. As a result, Columbia University has had to arrange to collect clinical data from the private dentists by asking the parents to sign a consent form and provide contact information for the dentist; the awardee then follows up with the dentist to get the data. This process is time-consuming. Second, the PDDSs are so booked that it can be difficult even for families of the children who were originally recruited from the PDDSs to get an appointment for the 12-month exam. The PDDSs are trying to overcome this challenge by reserving time slots for the MSB children who are due for this exam.

Collecting administrative data has also posed some challenges. The software that the CHWs had been using to report data on participants and their interactions with them was inefficient because once the CHWs submitted data they no longer had access to it. As a result, CHWS kept their own notes that they could access as needed and then re-entered the data into the software. The awardee has since been using new software, which is much more flexible and avoids the need to double-enter data. The software also allows the awardee to better monitor the performance of CHWs. For example, program leaders identified one CHW who was underperforming and worked with her and her supervisor to improve her performance.

> "Many of [the parents], even if they want to make changes, it's like, 'Why would I focus on brushing my kid's teeth when I'm getting evicted?'"
>
> — *CHW*

Another step that Columbia University took to improve the collection of administrative data was to provide the CHWs and PDDSs with tracking tools that show what they have done each month (for example, the number of referrals from the PDDSs and the number of phone calls, follow-up visits, and families enrolled by the CHWs). The tools have helped the awardee to monitor the performance of its partner organizations. CBO partners also found the tracking tools to be helpful in monitoring their own progress and the work of their CHWs, which motivated them to try to do better each month.

From these monthly tracking metrics, the awardee discovered that NYU was underperforming with regard to case finding, collecting and entering data from the PDDSs clinical records, and administrative record keeping. To address the problem, Columbia University initially scheduled weekly check-in phone calls with the NYU project coordinator. Ultimately, however, the awardee decided to terminate the subcontract with NYU and take over its functions. To oversee data collection and entry, Columbia University hired a dentist epidemiologist. One awardee leader noted that NYU had long-standing relationships with the PDDSs, but Columbia University did not. As a result, NYU played a vital role in the early stages of the program as an intermediary between Columbia University staff and staff at the PDDSs; by the second program year, however, the PDDS staff had come to know the Columbia University staff, so NYU's role as intermediary was no longer necessary.

2. Organizational and external context

> "I think [NYU] tried to finesse the PDDS sites saying, 'You can still do what you always did, but you ought to pay a little more attention to disease management,' instead of our approach of saying, 'This is fundamentally a change in care and a fundamental change in how you're gonna be paid in the future.'"
>
> — *Program leader*

Several factors in the external context posed challenges to the implementation of MSB, including the professional culture of dentistry and program participants' competing priorities and cultural barriers. The PI felt that the PDDSs were pushing back against MSB's disease management approach and were therefore less than desirably engaged in the program. He commented that the PDDSs have some valid reasons for resisting the approach because the mandates for training residents and generating revenues for their programs are based on the number of dental procedures they perform, not on educating families about dental health and other preventive measures. The PI also felt that NYU, as the prior liaison to the PDDSs, had soft-pedaled the program to the PDDSs in terms of the extent to which it would change routine dental care. NYU disagreed that the PDDSs had not embraced the disease management approach, citing as evidence their agreement to participate in the program. As noted, Columbia University discontinued its subcontract with NYU and began to work directly with the PDDSs. For example, the PI's presentations to the PDDS residents were, as mentioned, an attempt to clarify the extent to which MSB represents a major shift in the approach to dentistry and to make the case for that shift.

Another factor in the external context that has influenced implementation is that the families that MSB is intended to serve face many challenges in their lives, and oral health is typically not

a high priority. These circumstances affect not only the families' willingness to enroll in MSB but also the extent to which they engage with the program. CHWs try to address the families' competing needs and priorities while working to raise their awareness and boost their understanding of the importance of oral health. One CHW thinks that the program should emphasize and support families' needs more broadly and that the CHWs need more resources to help families with this broad range of needs.

Cultural traditions make behavioral change more difficult for some families. One interviewee commented that for a lot of participants who are from Latin America, some of the concepts promoted by MSB are foreign. For example, for people who may not have always had running water in their homes, or if the running water was not safe to drink, the sink is not a place of hygiene for them, and the idea that it is better to drink tap water than bottled water because it is fluoridated requires a major shift in thinking. The fact that the CHWs are from the same countries as many participants helps them to address many of these cultural barriers effectively.

C. Development of the payment model

One payment model that Columbia University envisioned was that the CHWs would be paid directly by Medicaid on a fee-for-service (FFS) basis. To allow the CHWs to be paid directly, New York would have to file a state plan amendment (SPA) with CMS. The New York State Medicaid Redesign Group has, however, rejected the idea of having any FFS components in the redesign, so it is not willing to file the necessary SPA.

As a result, Columbia University is now pursuing alternative payment models. It is currently focused on identifying one or more Medicaid managed care organizations and their dental subcontractors that would adopt and institutionalize MSB. The awardee expects the organizations to be interested in doing so because of the substantial savings that MSB could produce. Moreover, a shortage of pediatric dentists in the area makes it difficult for managed care companies to find enough practices to cover the need, so an intervention that reduces the demand for dental repair has added appeal. The PI predicts that if one managed care company tries MSB and has success (higher profits, lower costs, and better outcomes), additional companies will be watching and will pick it up, thus moving MSB into the mainstream.

In the longer term, the awardee expects that the field of pediatric dentistry will become a pay-for-value system. When that happens, all dentists will have financial incentives to improve oral health outcomes, so many more of them may be interested in paying for a tool like MSB.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Columbia University

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	1,146
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,932
Likelihood of all-cause hospitalizations	2,219
MDE sample size requirement to detect 20% effect	
Total expenditures	733
Likelihood of all-cause hospitalizations	555
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician and staff surveys
Implementation data that will be analyzed	Awardee is analyzing its clinical data

DDB = difference-in-differences Bayesian

We anticipate being able to choose a comparison group by using propensity score matching to select comparison beneficiaries who had similar characteristics and dental service use as treatment beneficiaries did during the baseline period. However, to implement this strategy, we will need to limit the treatment group to those who received dental care during the baseline period. Due to lags in Medicaid data, we do not know how many current participants actually received dental care prior to the intervention, so we are not certain that our sample size will be sufficient. Although it is unclear whether some of the key outcomes that the awardee is trying to affect (such as dental surgeries) will be observable in the claims data, at least some of the awardee's outcomes (for example, receipt of dental care and total expenditures) will be captured in the claims data.

V. NEXT STEPS

A. Implementation evaluation

As Columbia University enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We have some concerns about being able to identify beneficiaries with early childhood dental caries by using claims data. Therefore, the next step in the impact analysis includes assessing whether we can identify a valid potential comparison group by restricting the sample (that is, the participants and the potential comparison group) to those beneficiaries who received dental care in the baseline period. Assuming this approach works, we will then use propensity score matching to choose comparison beneficiaries who are similar to participants in terms of their characteristics and prior dental service use. We will then estimate the impacts of the program on key outcomes. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include community health workers, their supervisors, and project management staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians are dental residents and their supervisors. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, which is scheduled to be launched in March 2017.

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APPENDIX B.13.

DETROIT MEDICAL CENTER

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REPORT

APPENDIX B.13

HCIA Round Two Evaluation: Detroit Medical Center

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Gateway to Health program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Detroit Medical Center's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Detroit Medical Center made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the Detroit Medical Center addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Detroit Medical Center's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Gateway to Health program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Detroit Medical Center is using funding from HCIA R2 to support the Gateway to Health program. The Detroit Medical Center designed the Gateway program to provide ongoing primary care services in a patient-centered medical home (PCMH) model to people living in Detroit, Michigan, who have been identified as frequent users of the emergency department (ED). Eligible individuals have no primary care physician (PCP) on record and have at least one of the following chronic conditions: (1) diabetes, (2) asthma, (3) hypertension, (4) congestive heart failure (CHF), (5) depression, (6) chronic obstructive pulmonary disease (COPD), and (7) HIV/AIDS. Detroit Medical Center staff had noted that many Detroit residents use EDs for primary care; many of them are Medicaid or Medicare beneficiaries with no PCP.

The Gateway centers are located within or adjacent to three of Detroit's largest EDs—at Sinai Grace Hospital (SGH), Children's Hospital of Michigan (CHM), and Detroit Receiving Hospital (DRH), all of which are operated by the Detroit Medical Center. The Gateway centers at SGH and CHM are co-located with existing clinics in or near the hospital. The DRH center is located within the ED, which gave up space to accommodate it.

The awardee recruits and enrolls patients through a two-stage process. First, staff tags patients who are listed in the hospital's electronic medical record (EMR) system and who meet the program's eligibility criteria as "potential Gateway (PG)." Second, once patients are tagged, PG patients are enrolled through multiple paths. The primary path is through the ED. When a PG patient presents in the ED, a triage nurse conducts a uniform triage assessment through which the patient is assigned a nationally standardized Emergency Severity Index Score on a scale of 1 (highest acuity) to 5 (lowest acuity). Patients with a score of either 4 or 5 are considered low acuity; they undergo a medical screening examination (MSE) conducted by a triage nurse. Depending upon the results, the triage nurse connects the patient to a Gateway navigator. The navigator asks the patient whether he or she has a PCP. If the patient does not have a PCP, the navigator offers the patient an opportunity to receive care at a Gateway center. The navigator provides a pamphlet explaining the Gateway program, the types of services provided by the center, the patient's option to receive care through a PCMH, and the freedom to opt out at any time. Navigators escort consenting patients to the appropriate Gateway center.

Eligible patients who present in the ED with a true medical emergency are appropriately treated in the ED instead of being referred to a Gateway navigator. In these cases, navigators (if the patient is treated in the ED) or social workers (if the patient is admitted to the hospital) inform the patients that they may receive follow-up services at a Gateway center after they are discharged. Gateway program leaders helped created an electronic order for a Gateway consultation, which can be placed through the EMR by a clinician treating an admitted eligible patient. This electronic consult triggers a Gateway social worker to visit the admitted patient at bedside to enroll the patient in the Gateway program. In addition, the Detroit Medical Center created a list of about 1,000 potential PCMH patients who are very frequent ED users (defined as more than five ED visits in a year) and who may partly meet the remaining eligibility criteria for the program. The awardee has reached out to patients on the list by telephone rather than waiting for them to present at the ED. Finally, eligible patients can be recruited to the program through referral. Referrals can come from existing Gateway patients; Detroit Medical Center staff; or

external organizations that the Detroit Medical Center has formed a partnership with, such as nursing facilities.

The Gateway center acts as a PCMH for participants with chronic health conditions. Gateway program leaders modeled their PCMH after the Southcentral Foundation Nuka System of Care, a model of health care redesign.[2] Gateway leaders are currently working toward PCMH accreditation. The PCMH model provides services for targeted individuals' health care needs, replacing high-cost episodic care received in the ED with coordinated, long-term primary care. The Gateway PCMHs employ nurse-practitioners (at DRH and SGH) or physicians (at CHM) who serve as PCPs. In addition, the Gateway PCMH care teams include a registered nurse care manager, a certified medical assistant, a behaviorist, a nutritionist, and a pharmacist educator. See Table 1 for a summary of the Gateway to Health program's characteristics.

Detroit Medical Center leaders believe that increasing Gateway participants' access to a usual source of primary care will lead to better management of chronic conditions and fewer ED visits. The awardee is seeking to improve the quality of primary care provided to this high-need, high-cost, underserved population. In doing so, it is expected that the Gateway centers will reduce health care costs not only by reducing the number of ED visits but also through care that is higher in quality; better coordinated; and patient-centered, such that it provides a broad range of clinical and social services.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Detroit Medical Center during the first year of its cooperative agreement.

- The Detroit Medical Center achieved its goal of enrolling participants within the first two to six months of when it was notified about receiving a cooperative agreement from CMMI. In addition, the Detroit Medical Center had all Gateway centers operational and fully staffed by August 2015.
- As of October 28, 2015, the Detroit Medical Center had enrolled 728 patients in the Gateway program. These patients made 1,595 total combined visits to the Gateway centers. The program's multidisciplinary team of clinical providers and frontline staff were providing participants with better access to primary care.

We also identified several initial challenges in implementing the program and the Detroit Medical Center's strategies for addressing them.

- Staffing the Gateway centers was more challenging than expected because of the centers' extended evening and weekend hours and because of the limited duration of the cooperative agreement. To address the staffing challenge, the Detroit Medical Center recruited mid-level providers, such as nurse-practitioners, to lead the Gateway clinical teams, instead of physicians.

[2] See https://www.southcentralfoundation.com/nuka/.

- Program leaders at the Detroit Medical Center were concerned that patients experiencing a true medical emergency might be inappropriately referred to a Gateway center, which would violate the Emergency Medical Treatment and Active Labor Act (EMTALA). This concern was mitigated by a review conducted by CMS of hospital processes associated with EMTALA requirements. The review was not related to the Gateway program. However, CMS found that the medical staff's bylaws and ED triage processes, which include the MSE used in the Gateway program, are compliant with EMTALA.

Finally, we identified several early lessons learned by the Detroit Medical Center in implementing its program.

- Gateway program leaders learned that gaining the support of internal stakeholders was crucial to program success; that is, for the program to be effective, leaders and clinical staff in the ED had to endorse and champion the Gateway centers.
- Although it was easy to identify potential Gateway participants through the EMR system, program enrollment may have been impeded because patients must present themselves in the ED to be recruited. In addition, variation in screening by ED staff may have affected how successfully the program reaches the intended patients.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Detroit Medical Center made progress in the following areas:

- Overall, the Detroit Medical Center reported that it enrolled 3,447 participants from January 2015 (when it launched its program) through May 2016, which represents about 21.5 percent of its original 16,130 goal for three-year projected participants. The steady increase in participant enrollment is likely due to the Detroit Medical Center's various recruitment efforts—including, the establishment of new pathways to enrollment through referrals, the development of the "Consult to Gateway" tool to better recruit eligible hospitalized patients, and marketing campaigns.
- To accommodate growing participant volume and to increase quality of care, the Detroit Medical Center has strengthened its service delivery model by prioritizing staff engagement to mitigate the effects of staff turnover and by developing partnerships with internal and external stakeholders to improve the number and scope of services available to Gateway patients.
- Though it has not yet fully developed a payment model, the Detroit Medical Center expects that the model will support fee-for-service (FFS) Medicaid and Medicare beneficiaries as well as those eligible for managed care plans under the Medicaid expansion. Gateway program leaders have met with payers to begin to define their needs for meaningful partnerships with the Gateway program.

Over the past year, the Detroit Medical Center also made several changes to its program:

- To further improve participant recruitment, the Detroit Medical Center added an additional pathway to program enrollment through referrals. Eligible patients can now be referred to

the Gateway program by an existing Gateway patient, Detroit Medical Center staff, or an external partner organization.

- The Detroit Medical Center revised its three-year enrollment target from 16,130 participants down to 11,528participants. Gateway program leaders believed that the revised target was more achievable given the rate of participant enrollment during the first program year and the current level of staffing. To increase the likelihood of meeting the revised target, the Detroit Medical Center successfully petitioned CMS to expand the program's eligibility criteria to capture additional patients who were historically ED super-utilizers and who have a qualifying disease, without waiting for them to present in the ED. In particular, this includes individuals in long-term care settings who do not have a PCP.

Below we note the key challenges that the Detroit Medical Center worked to address in the second year of its cooperative agreement.

- The Detroit Medical Center is dealing with inconsistent ED triage nurse engagement. ED triage nurses, who are not Gateway staff, play a crucial role in connecting eligible Gateway patients who present in the ED to a Gateway navigator. Some triage nurses appear to be frustrated by the additional steps required to determine patients' eligibility for the Gateway program—including conducting the MSE and connecting eligible patients to the Gateway navigator—and thus may not be capturing as many eligible patients for program recruitment as possible.
- Growing patient volume has led to space constraints in the existing Gateway centers. To accommodate further enrollment increases, the Detroit Medical Center must find additional patient care rooms.
- Provider shortage continues to be an issue for the Detroit Medical Center, which has experienced staff turnover at several Gateway centers and has struggled to fill open positions in a timely manner.

As the Detroit Medical Center enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The Detroit Medical Center's efforts to develop a payment model may be hindered by challenges with documenting savings for potential payers, calculating accurate cost of care, and negotiating with multiple payers that have multiple payment models.

Table 1. Detroit Medical Center: Gateway to Health characteristics at a glance

Program characteristic	Description
Purpose	The Detroit Medical Center (DMC) designed the Gateway program to provide ongoing primary care services in a PCMH model to frequent ED users who have no provider and one of seven chronic conditions.
Components	• Medical home • Education and training
Target population	People living in Detroit who have been identified as frequent users of the ED who have no PCP and at least one of the following chronic conditions: (1) diabetes, (2) asthma, (3) hypertension, (4) CHF, (5) depression, (6) COPD, and (7) HIV/AIDS
Theory of change/theory of action	DMC focuses on changing participants' reliance on the ED for medical care by offering participants who seek treatment there the option of receiving immediate access to primary care at a Gateway center. This improved access to primary care will result in better health outcomes, fewer ED visits, and lower costs.
Payment model	Capitated payment, shared savings, FFS
Award amount	$9,987,542
Launch date[a]	January 20, 2015
Setting	Gateway centers located at or adjacent to three of Detroit's largest EDs
Market area	Urban
Market location	Detroit, MI
Outcomes	• Increase PCMH use • Decrease ED use and service costs • Improve overall health among target patients

[a]After the initial planning period, the awardee's program began to operate as of this date.

CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; ED = emergency department; FFS = fee-for-service; PCMH = patient-centered medical home; PCP = primary care physician

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Detroit Medical Center in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 18 through July 29, 2016. For the analyses of the Detroit Medical Center's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Gateway program leaders
- Gateway medical directors
- Gateway frontline staff

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the Detroit Medical Center's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

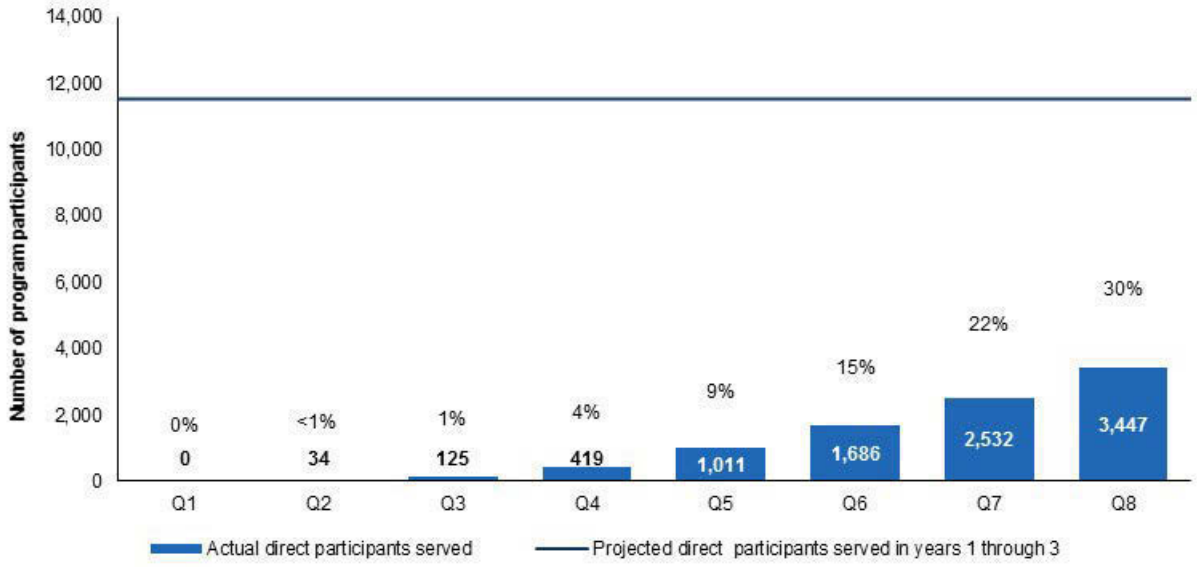
A. Program enrollment

Overall, the Detroit Medical Center reported to the implementation and monitoring contractor that it directly served 3,447 participants from January 2015 (the launch of its program)

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

through August 2016, which represents about 29.9 percent of its 11,525 projected direct participants (Figure 1). The Detroit Medical Center also reported that it indirectly served 63 participants from January 2015 through August 2016, which represents about 12.6 percent of its 500 projected indirect participants (Figure 2). Despite the steady increase in program enrollment over the past few quarters, Gateway program leaders said that a three-year projected target of 11,528 participants was more realistic than the initial target of 16,130. Gateway program leaders said that the revised target was more achievable given the rate of participant enrollment during the first program year. They also said that it would be more manageable given the current level of staffing. To increase the likelihood of meeting the 11,528-participant target, the Detroit Medical Center successfully petitioned CMS to expand the Gateway program's eligibility criteria. Awardee leaders expect the expanded criteria to better capture super-utilizers who lack PCPs but who may be difficult to recruit through the ED. Examples of newly eligible patient populations include family members of Gateway program participants, Detroit Medical Center employees, nursing facility residents, and youths in foster care. Awardee leaders said that the broader eligibility criteria would help optimize their participant recruitment efforts.

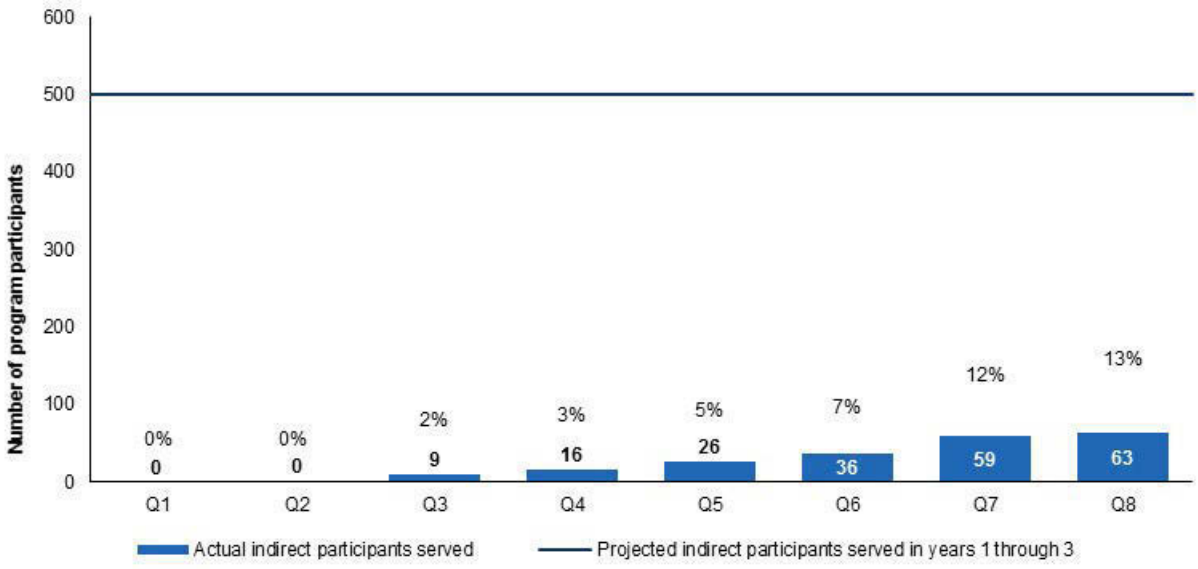
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. In July 2016, DMC lowered its three-year projected enrollment to 11,528 total participants, including both direct and indirect. This figure reflects the target reported in the most recent enrollment data from the implementation and monitoring contractor of 11,528 direct participants served.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. In July 2016, DMC lowered its three-year projected enrollment to 11,528 total participants, including both direct and indirect. This figure reflects the target reported in the most recent enrollment data from the implementation and monitoring contractor of 500 indirect participants served.

The progress that the Detroit Medical Center has made in meeting its three-year enrollment goal was influenced by several factors. First, Gateway leaders established new pathways to program enrollment, which improved the Detroit Medical Center's ability to recruit eligible participants. In addition to the existing and more common pathway to enrollment in the ED, new participants can now be enrolled through referral. Referrals can come from an existing Gateway patient, Detroit Medical Center staff, or a partner organization. Frontline staff reported that existing participants who were pleased with their experience with the program have encouraged family and friends to contact Gateway to inquire about their own eligibility, which has resulted in some new participant enrollment. In addition, the Detroit Medical Center Division of Occupational Health Services has referred a significant number of Detroit Medical Center staff who have no PCPs. Gateway staff noted that the number of internal referrals of employees to the program was greater than what they had expected. Finally, the Detroit Medical Center has partnered with 13 foster care agencies in the surrounding community, which send referrals to the Gateway center at CHM. The Detroit Medical Center sought out these partnerships in an effort to boost participant enrollment at the CHM site, which was the last of the Gateway centers to become operational and has consistently lagged behind the other sites in enrollment. Due to the success of these partnerships, the Detroit Medical Center is working to form partnerships with subacute and long-term care nursing homes in order to generate more Gateway participant referrals.

In addition, the "Consult to Gateway" tool has enhanced the process for recruiting eligible hospitalized patients. If an eligible patient presents in the ED with high acuity, the patient will be appropriately treated in the ED or admitted as an inpatient. Gateway leaders already work with ED inpatient residents, registered nurse case managers, and social workers to streamline the process of arranging follow-up care at a Gateway center for patients who were admitted and discharged. To improve this existing pathway to enrollment, the Gateway data manager worked with the Detroit Medical Center Information Systems Department (ISD) to build an electronic consultation order into the EMR system. This allows Detroit Medical Center clinical staff to order a Gateway consultation when treating an eligible patient, which then prompts a Gateway social worker to visit the patient at bedside to introduce the Gateway program, schedule a follow-up appointment, and arrange transportation, if needed. Gateway leaders and staff said that the "Consult to Gateway" order has been a valuable tool for participant recruitment.

> "I think initially, no one knew [Gateway] was here. Even employees of [Detroit Medical Center] . . . just didn't know. Now that it is out . . . and more people are inquiring about [Gateway], [they learn that] we are here and you can stop in. You don't necessarily need an appointment. We are always here. That is really helpful to a lot of people. . . . They can come in when it is suitable for them."
>
> *— Gateway provider*

Gateway leaders are marketing the program externally to the surrounding community and internally within the Detroit Medical Center. These efforts have also facilitated the awardee's progress toward its enrollment goal. For example, program leaders developed marketing materials that have been distributed to community-based organizations such as churches and have canvassed with flyers and other marketing materials at local grocery stores and health fairs. To generate more internal referrals, Gateway program leaders conducted informational sessions with the Detroit Medical Center's asthma and HIV clinics and with acute care and inpatient social workers. Gateway leaders also developed computer screen savers, which have been added to many Detroit Medical Center computers to promote awareness of the program.

Although enrollment efforts have been mostly successful, Gateway leaders are dealing with some barriers to enrollment. Perhaps the most significant barrier to program enrollment is the inconsistent engagement of the Detroit Medical Center ED triage nurses. The triage nurses, who are not Gateway staff, play an instrumental role in connecting eligible patients who present in the ED to a Gateway navigator. A triage nurse must conduct a uniform triage assessment to determine acuity when any patient presents in the ED; if the patient is low acuity, the nurse is then supposed to conduct an MSE for the Gateway program. Depending upon the results, the triage nurse connects the patient to a Gateway navigator, who offers the patient the opportunity to receive care at a Gateway center. Initially, triage nurses had no issue facilitating this aspect of the Gateway referral process. But the triage nurses apparently grew reluctant about the "extra step in their job" to conduct the MSE. Gateway program leaders reported that the triage nurses are now less diligent about completing the MSE on low-acuity patients and then connecting eligible patients with a Gateway navigator. This is a barrier to program enrollment because eligible patients presenting in the ED may fall through the cracks. Program leaders don't know why this change in the behavior of the triage nurses occurred. However, SGH staff have addressed this problem by sending a daily email to program leaders that details how many eligible patients received an MSE among the eligible patients that presented in the ED that day.

This daily record helps care managers and program leaders follow up with triage nurses to ensure that the MSEs occur.

The Detroit Medical Center also experienced barriers to program enrollment due to space constraints and Gateway provider shortages. As participant enrollment steadily increased over the first year of the program, accommodating the growing volume of patients within the physical space allocated for the Gateway centers proved challenging. Program leaders are actively working to acquire additional patient care rooms, but this is difficult given that the Detroit Medical Center is a busy urban hospital system with limited available space. Because Gateway center staff have reported that their teams have struggled to find space for new and returning patients at the current participant volume, this problem will likely be exacerbated by additional growth in enrollment, unless more physical space is acquired. In addition, several Gateway centers have experienced staff turnover and program leaders have found it challenging to fill some of the positions in a timely manner due to the requirement that Gateway staff must work evenings and weekends. Lack of available providers has hindered program enrollment because Gateway centers cannot recruit new participants and treat existing patients effectively if there are not enough staff to accommodate the patient volume.

B. Implementation of the service delivery model

The Detroit Medical Center has made significant progress in implementing its service delivery model since its January 2015 program launch date. The Detroit Medical Center was able to get all three Gateway centers fully staffed and operational fairly quickly, which enabled the program to start enrolling and treating patients early in the three-year cooperative agreement. As of May 2016, program participants made over 5,000 total combined visits to the three Gateway centers. In addition, Gateway leaders have reportedly received overwhelmingly positive responses in patient satisfaction surveys. Program leaders continue to look for ways to improve the quality of care delivered at the Gateway centers and to identify opportunities to increase the number of services available to program participants.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.

1. Intervention characteristics

Several characteristics of the Gateway model have created advantages and challenges in terms of program implementation. For example, the PCMH care model, which is the core of the Gateway program, continues to be a major facilitator of overall program success. Primary care services in Detroit and the surrounding community are critically lacking, which means that many patients are unable to properly manage complex medical needs. To strengthen the primary care services available to its patients, the Detroit Medical Center selected the PCMH care model because its interdisciplinary approach allows providers to identify and treat the full range of patient needs.

> "[Gateway] patients that were not used to taking their medications are now used to taking their medications. A high percentage of [Gateway] patients [now have conditions that] are under control. When it comes to disease management, we are really satisfied . . . and we feel that the patients are . . . improving [their] health outcomes."
>
> *— Gateway medical director*

Because of the newly available primary care services, Gateway staff say that many participants are experiencing improved health outcomes in the short time they have been enrolled in the program. One example provided by a Gateway medical director was that of a patient with undiagnosed rheumatoid arthritis. She had been suffering from the condition for a long time without a proper diagnosis because she lacked access to primary care services. The 19-year-old patient's condition was so poor prior to enrolling in the Gateway program that she had to use a wheelchair because she was unable to walk. Within a couple of weeks of receiving services at a Gateway center, the patient received a proper diagnosis, was started on a medication regimen, and could move from the wheelchair to crutches. She began receiving occupational and physical therapy services through the Gateway program and within seven to eight months of receiving services at Gateway, she was walking again and able to return to her job.

Another characteristic of the Gateway program that respondents cite as contributing to the program's overall success is the centers' convenience—for example, the extended hours of operation as well as the colocation of services. All three Gateway centers are open late on weekdays and offer weekend hours. By creating more open access to primary care services, the Detroit Medical Center has made it easy for program participants to get services at a time that is convenient for them, which enables staff to keep patients engaged in services. Similarly, the colocation of services makes the Gateway centers convenient sites to receive care. One Gateway medical director explained that the Gateway centers are designed to be a "one-stop shop," where patients can be seen by a provider and receive the appropriate treatment on site. For example, patients often need to visit a pharmacy to receive medications prescribed by their Gateway provider; this can be done easily because the Gateway centers are often situated in close proximity to a Detroit Medical Center pharmacy.

2. Implementation processes

The Detroit Medical Center has made several changes to the implementation process since launching the Gateway program in January 2015. For example, the Detroit Medical Center began placing greater emphasis on staff engagement due to challenges with maintaining adequate staffing levels at the Gateway centers. Strategies used by Gateway program leaders to improve staff engagement included staff outings; team-building events; and a staff retreat with

representatives from the Alaska Southcentral Foundation, the health care system that developed the PCMH model that the Gateway care model is based on. Program leaders reported that the staff retreat was helpful because it reinforced the importance of the PCMH model and how much time it can take to implement the model properly. Overall, the staff engagement strategies appear to have been successful. The Detroit Medical Center recently administered an employee engagement survey and respondents reported that it received overwhelmingly positive responses.

During the second program year, the Detroit Medical Center also prioritized strengthening relationships with internal and external stakeholders to improve quality of care and the number and types of services available to Gateway patients. For example, awardee leaders developed a partnership with the Detroit Medical Center's cardiology practice to better treat patients with CHF. Detroit Medical Center cardiologists often cannot dedicate a significant amount of time to treating and monitoring CHF patients, so those patients tend to have poor disease management and, consequently, over-utilize the ED. Cardiologists now refer CHF patients to a Gateway center, where they are enrolled in a special program in which they work closely with Gateway staff to provide daily updates on weight gain and other factors that are key markers of CHF status.

In addition, the Detroit Medical Center is exploring options for contracting services from external providers. For example, program leaders are currently in discussion with Senior Care Network, a senior care management organization in Michigan. The Detroit Medical Center is hoping to contract Senior Care Network to provide in-home behavioral health services to Gateway patients. If a partnership is established, the Detroit Medical Center will need to work out a payment structure because it cannot currently bill for in-home behavioral health services. Awardee leaders believe that expanding the scope of services available to Gateway patients will improve health outcomes and further increase patient satisfaction with the program.

> "A [Gateway] patient was diagnosed with HIV and [was transferred] to an HIV specialist. . . . The [patient] was prescribed medication . . . and went to the pharmacy, but it wasn't covered by [the patient's] insurance. [The patient] didn't have money to pay for the medication. The first thing the patient did [was] come to [Gateway] . . . and asked for help. [The patient] knew that they can count on us at any time . . . and we will help them."
>
> *— Gateway medical director*

The Detroit Medical Center has also developed relationships with pharmaceutical companies to increase the number of resources available to treat uninsured patients. When an uninsured patient is referred to a Gateway center, staff help the patient apply for Medicaid. The eligibility determination process typically takes about 30 days. The Detroit Medical Center partnered with pharmaceutical companies to obtain samples of medications for conditions such as high cholesterol, hypertension, asthma, and COPD, which allowed Gateway staff to begin prescribing medication to uninsured patients while they waited for Medicaid eligibility.

Another change made by the Detroit Medical Center to the implementation process was increasing the availability of population health management tools to Gateway staff. One such tool was Crimson Care Management, a technology platform that facilitates care coordination through targeted data collection. Gateway program leaders had hoped to license Crimson Care Management at each Gateway center, but the cost of doing so was too high and the effort failed to gain approval from Tenet Healthcare, the parent company of the Detroit Medical Center.

Despite this setback, awardee leaders continue to seek to adopt alternative technology platforms or processes to assist Gateway staff with population health management.

C. Development of the payment model

Though it has not yet fully developed a payment model, the Detroit Medical Center expects that that model will support FFS Medicaid and Medicare beneficiaries, those eligible for managed care plans under the Medicaid expansion, and Detroit Medical Center employees. Based on prior experience with the Pioneer Accountable Care Organization payment model, the Detroit Medical Center envisions a value-based, risk-based model for the Gateway program. But the awardee is exploring several other potential payment models, such as shared savings, enhanced FFS, and hybrid models. The awardee had also proposed that 50 percent of cost savings to major public payers (CMS for Medicare patients and the state Medicaid program for Medicaid patients) would be returned to the Gateway centers to cover the cost of expanded services.

Gateway program leaders have met with payers including UnitedHealthcare, Blue Cross Blue Shield, Total Health Care, Harbor Health Plan, and Meridian Health Plan to begin to define their needs for meaningful partnerships with the Gateway program. Talks with each payer revolved around the services provided at the Gateway centers, how the centers aim to allow patients direct access to primary care services from the ED, and how payers can direct their high ED utilizers directly to Gateway centers. The meetings revealed that each payer is looking at innovative ways to reduce ED overutilization; many payers believe that the Gateway program can help achieve this aim in a quick and efficient manner.

IV. FINDINGS FROM ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

For the purpose of our evaluation, the treatment group consists of beneficiaries recruited for the Gateway program who either (1) used the Detroit Medical Center's EDs for medical care at least five times during the past year or (2) had at least one of seven chronic conditions and were referred to the Gateway program without having had an ED visit. Beneficiaries who indicated that they had an ongoing relationship with a primary care provider were deemed ineligible for the program and were referred back to that provider. The treatment group also includes patients who enrolled in Gateway as well as recruited patients who met the eligibility criteria but refused to enroll.

The most recent finder file from the awardee contained 19,955 patients who were flagged as potentially eligible as of May 31, 2016 or earlier. A total of 228 patients met the eligibility criteria and were directly referred to Gateway by other providers. The remaining 19,797 patients presented at a DMC ED in which recruitment by patient navigators is centered. The navigators were unable to make contact with patients as they left the ED or during follow-up attempts about 60 percent of the time (12,098 patients). These patients were excluded from the treatment group. Of the remaining 7,699 patients, 60 percent (4,755) were disqualified because they indicated that they had an ongoing relationship with a primary care provider. The residual 3,172 patients are the remaining members of the treatment group, 1,767 of whom (56 percent) refused recruitment, and 1,407 were enrolled.

Because we are conducting an intent-to-treat evaluation, we are defining the date of the initial recruiting attempt as the participant's enrollment date, although for some who accepted the invitation to enroll in Gateway, the date of the first visit to a Gateway clinic or the formal signing of the institutional review board form occurred later. For patients who were referred to Gateway, the date of their first visit is the beginning of their treatment period. For those whose recruitment was triggered by an ED visit, any costs associated with that visit (or with a subsequent hospitalization) were assigned to the baseline year, and the treatment period began on the day after their ED visit or after they were discharged from the hospital.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been recruited for the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, 162 participants were included in the analysis of baseline characteristics for this report, 93 of whom (57 percent) were successfully recruited and enrolled.

A. Baseline characteristics of treatment group

The Medicare FFS beneficiaries recruited for the Gateway program are a predominantly disadvantaged and high-needs group (Table 2). A sizable majority of them are under the age of 65 (61 percent); only one percent are over the age of 85. In total, 7 in 10 beneficiaries were originally eligible for Medicare due to a disability. Nationally, only 24 percent of beneficiaries became eligible due to a disability. Thus, the awardee is recruiting a population that generally has significant health care needs and high Medicare expenditures. Consistent with this, over half (51 percent) of the recruited beneficiaries are dual eligibles, which indicates a high level of social need. This compares with 15 percent in the national Medicare FFS population.

Nearly all recruited beneficiaries are African American (93 percent), reflecting the racial composition of Detroit. In comparison, only 11 percent of beneficiaries nationally are African American. The average hierarchical condition categories (HCC) risk score (1.5) is 50 percent higher than it is among all Medicare FFS beneficiaries, suggesting that Gateway participants are in substantially poorer health and have greater needs for care than does the general Medicare FFS population.

Consistent with these high-need characteristics, treatment group members had high rates of service use and Medicare expenditures in the year before enrollment. In Table 3, we report baseline utilization and expenditure data for a common set of measures, including the four core measures from CMMI. By offering convenient, patient-centered primary care services in the Gateway clinics, the Detroit Medical Center expects to reduce the utilization of high-cost services in EDs and hospital settings compared to what would have occurred absent the program. If reductions in the utilization of these high-cost services are realized, then there would be a corresponding decline in Medicare expenditures. We examined the baseline costliness of care by calculating average per beneficiary per month (PBPM) Medicare payments—in total and by major types of services. The average total PBPM Medicare payment during the baseline year was $1,503. By comparison, the national average total PBPM expenditure in 2013 ($792) was about half of the awardee's PBPM average expenditure. Average PBPM Medicare payments for acute inpatient care ($614) and physician services ($382) were the largest drivers of the total cost of care. Outpatient care, which includes facility charges for ED visits not resulting in a hospital and/or an observation stay, contributed $226 to the total PBPM cost.

About one-third of the recruited beneficiaries in the treatment group (34 percent) were hospitalized during the baseline year. The overall annual rate of acute care hospitalizations was 841 per 1,000 Medicare FFS beneficiaries during the baseline period, with a 41 percent likelihood of a 30-day readmission per hospital discharge among those hospitalized. The readmission rate is more than twice the national average of 18 percent for Medicare FFS beneficiaries, as reported by CMS. We would expect nearly all recruited beneficiaries to have had an ED visit, and 79 percent had at least one visit that did not result in a hospitalization. Beneficiaries in the treatment group averaged 4.3 ED visits during the baseline period. The corresponding rate for outpatient ED visits that did not result in a hospitalization was 3.2, suggesting that these beneficiaries often visited the ED when they had low-acuity conditions, many of which may have been treatable in physicians' offices.

At baseline, the annualized rate of primary care visits (6,641 per 1,000 Medicare FFS beneficiaries) was substantially lower than the rate of specialty visits (13,081 per 1,000 Medicare FFS beneficiaries), suggesting a possible need for greater access to primary care, which is a primary focus of the Gateway program. More than half of primary care and specialist visits (56 percent and 59 percent, respectively) take place in ambulatory care settings. As would be expected given the fact that recruitment occurred in EDs, there was dramatically higher inpatient and ED use during the fourth quarter of the baseline year. For instance, the rate of hospitalizations per 1,000 beneficiaries rose from 842 in the earliest quarter of the baseline year to 1,313 in the quarter that ended in Gateway recruitment. The corresponding rates for outpatient ED visits were 3,250 and 5,096. This suggests that the beneficiaries' health conditions are becoming worse, thus increasing the likelihood of ED visits and, in turn, opportunities for recruitment into the Gateway program.

Finally, we calculated the prevalence of the seven chronic conditions used in the eligibility criteria for the program (see Table 4). The conditions are based on Chronic Conditions Warehouse (CCW) definitions. Not surprisingly, the treatment group had higher chronic condition rates than those in the full Medicare population. For instance, the prevalence of asthma was nearly 2.5 times greater in the treatment group than in the general Medicare FFS population as a whole (14 percent versus 5 percent). Over half of the beneficiaries in the treatment group had hypertension (54 percent), slightly below the national average. Medicare beneficiaries in the treatment group averaged 1.6 of these seven chronic conditions, with 31 percent not having any of the seven conditions in 2014.

We also compared chronic condition prevalence rates for beneficiaries who accepted recruitment into the Gateway program with the rates for those who did not. Although the prevalence rates of several conditions varied from 5 to 10 percentage points, neither participants nor refusers consistently had higher prevalence rates. It is likely that this inconsistent pattern is an artifact of the relatively small size of the two subsamples. The overall burden of chronic conditions on patients was similar between the two groups.

Although the HCC scores of participants and refusers were similar, the average PBPM Medicare payments for participants was only $1,283 compared with $1,811 for those who declined recruitment. These cost differences are reflected in higher inpatient, hospital outpatient, and physician costs. The rate of readmissions for hospitalized refusers was twice as high as the rate for participants during the baseline year (52 versus 24 percent). It will be important to see whether these patterns persist after the treatment group size grows larger.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 162)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	99	61
65 to 74	47	29
75 to 84	14	9
85 and older	2	1
Gender		
Female	72	44
Male	90	56
Race		
White	11	7
Black	151	93
American Indian, Alaska Native, Asian/Pacific Island American, or other	Not applicable	Not applicable
Hispanic	Not applicable	Not applicable
Original reason for Medicare eligibility		
Old age and survivor's insurance	45	28
Disability insurance benefits	115	71
End-stage renal disease (ESRD)[a]	2	1
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	83	51
HCC score[c]		Statistic
Mean		1.5
25th percentile		0.56
Median		1.09
75th percentile		1.71

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	162	143	154	159	162
Average Medicare expenditures PBPM[a]					
Total	1,503 (221)	1,075 (305)	1,196 (241)	1,457 (312)	2,221 (413)
Acute inpatient	614 (125)	383 (224)	529 (179)	478 (213)	1,034 (239)
Inpatient other[b]	127 (50)	74 (45)	0 (0)	212 (96)	211 (125)
Outpatient[c]	226 (42)	220 (61)	176 (37)	201 (46)	303 (57)
Physician services	382 (43)	307 (44)	351 (47)	402 (56)	460 (58)
Home health	101 (20)	81 (32)	87 (22)	104 (28)	129 (27)
Skilled nursing facility	41 (16)	6 (27)	25 (25)	55 (35)	73 (37)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	12 (5)	4 (2)	29 (20)	5 (2)	10 (4)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	841 (174)	578 (248)	701 (232)	735 (347)	1,313 (253)
Outpatient ED visits	3,250 (488)	2,974 (1,272)	2,346 (491)	2,495 (507)	5,096 (589)
Total ED visits	4,320 (699)	3,552 (1,254)	3,101 (674)	3,598 (800)	6,872 (805)
Observation stays	431 (163)	289 (186)	297 (120)	552 (259)	566 (161)
Primary care visits in any setting	6,641 (841)	4,996 (957)	5,232 (776)	7,879 (1,298)	8,236 (1,139)
Primary care visits in ambulatory settings	3,728 (397)	3,379 (513)	3,344 (494)	4,307 (514)	3,835 (534)
Specialist visits in any setting	13,081 (1,665)	9,905 (1,892)	11,029 (1,666)	13,105 (2,303)	17,836 (2,424)
Specialist visits in ambulatory settings	7,684 (717)	6,006 (1,043)	6,742 (898)	6,776 (871)	10,964 (951)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	34 (4)	8 (2)	9 (2)	12 (3)	23 (3)
Percentage with an outpatient ED visit[e]	79 (3)	26 (4)	26 (3)	31 (4)	64 (4)
Percentage with an observation stay[f]	16 (3)	2 (1)	5 (2)	6 (2)	11 (2)
Percentage with a 30-day readmission among all discharges	41 (5)	36 (12)	39 (12)	52 (9)	28 (8)
Percentage of participants with a readmission among all participants	6 (2)	1 (1)	2 (1)	3 (1)	3 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

Table 4. Prevalence of chronic conditions in 2014 among Medicare FFS beneficiaries in the treatment group, by whether they accepted recruitment (percentages unless otherwise indicated)

Chronic conditions	Total treatment group	Accepted recruitment into program		National Medicare prevalence
		Yes	No	
Asthma	14	15	13	5
Heart failure (CHF)	15	14	16	14
Chronic obstructive pulmonary disease	19	22	15	11
Diabetes	28	25	32	28
Hypertension	54	53	55	57
Depression	26	29	23	17
HIV/AIDS	4	6	2	0.4
Number of observations	**149**	**87**	**62**	

Source: Mathematica analysis of information from the awardee's finder file and Medicare claims and enrollment data as of May 31, 2016. National prevalence rates are from https://www.ccwdata.org/web/guest/medicare-charts/medicare-chronic-condition-charts except for HIV/AIDS rates, which are from the Kaiser Family Foundation Fact Sheet, "Medicare and HIV," October 2016; available at http://files.kff.org/attachment/Fact-Sheet-Medicare-and-HIV.

Notes: The seven chronic conditions are targeted by the Gateway program and serve as eligibility criteria. The prevalence is based on 2014 CCW chronic "ever had" condition flags and may not precisely replicate the clinical definitions used by DMC to identify patients with specific chronic conditions. The sample hence excludes any beneficiaries in the treatment group who were not Medicare FFS beneficiaries for all 12 months of 2014. DMC added two conditions after the start of the program, but they apply only to children.

CHF = congestive heart failure; CCW = Chronic Conditions Warehouse

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Detroit Medical Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	248
Projected Medicaid population with 6 months of program exposure	3,382
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,563
Likelihood of all-cause hospitalizations	1,423
MDE sample size requirement to detect 20% effect	
Total expenditures	641
Likelihood of all-cause hospitalizations	356
Participation/selection bias of concern	Yes, patient self-selection high/high refusal rate
Full implementation of new intervention	Questionable, cannot identify degree/intensity of intervention
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Serious concern. We may not be able to identify a strong comparison group.
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	PPIO
Primary reason for no rigorous evaluation	Lack of adequate comparison group
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

PPIO = pre-post intervention only

At this point, we do not expect to conduct a rigorous impact evaluation for the awardee. The primary concern is constructing a solid comparison group given a very low rate of participation among those who are flagged as meeting initial eligibility criteria—that is, frequent ED usage, no usual source of primary care, and consent to participate. To date, the awardee has identified almost 20,000 potential program participants based upon review of its EMR for frequent usage of its EDs. However, fewer than 1,500 of the 20,000 potential participants have enrolled in the program because (1) they were not recruited before they left the ED and could not be contacted after discharge; (2) they were found to be ineligible because they stated they had a primary care provider, who was not identified in the awardee's EMR; or (3) they refused to enroll in the program. We have serious reservations about our ability to develop a claims-based algorithm that identifies such a small percentage of potential participants within an intent-to-treat framework, which would lead to significant dilution of intervention effects. We will attempt to devise a claims data algorithm—using observations on eligible and ineligible Detroit Medical Center patients—to assess the likelihood that participants were contacted, had a primary care provider, and agreed to participate. However, given our concerns, it is likely that we will restrict our

analyses to a pre-post intervention-only impact analysis—far less rigorous than our standard of a difference-in-differences analytic approach. At this point, we do not have any awardee-specific data on implementation to report. We will report on the experiences of staff and participants, based on our surveys.

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V. NEXT STEPS

A. Implementation evaluation

As the Detroit Medical Center enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will continue to monitor program engagement and enrollment. If we observe a substantial increase in the participation rate, we will attempt to devise a claims data algorithm—using observations on eligible and ineligible Detroit Medical Center patients—to assess the likelihood that participants were contacted, had a primary care provider, and agreed to participate. Absent the development of a solid comparison group, we will move forward with a pre-post intervention-only impact analysis—far less rigorous than our standard of a difference-in-differences analytic approach.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, behavioral health specialists, patient navigators, social workers, dieticians, medical assistants, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.14.

FUND FOR PUBLIC HEALTH IN NEW YORK

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MATHEMATICA Policy Research

REPORT

APPENDIX B.14

HCIA Round Two Evaluation: Fund for Public Health in New York

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and participant outcomes (impact evaluation). This program narrative, the second a series of four, updates the narrative in our first annual report in which we described our early understanding of Project INSPIRE, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress made by the Fund for Public Health in New York, Inc., in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Fund for Public Health in New York made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the Fund for Public Health in New York and its implementing partners addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its partners to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Fund for Public Health in New York's Medicare beneficiaries and Medicaid enrollees, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of Project INSPIRE (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries and Medicaid enrollees (Section IV)
- Next steps in our implementation and impact evaluations, including the participant survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Fund for Public Health in New York has used funding from HCIA R2 to create Project INSPIRE. The awardee is a nonprofit organization established by the New York City Department of Health and Mental Hygiene (DOHMH) to advance the health of all New York City residents. DOHMH is the organization that is implementing Project INSPIRE, which is intended to improve the treatment for individuals with hepatitis C virus (HCV) in selected areas of New York City through the use of care coordination for participants and "tele-mentoring" of providers. Program leaders at DOHMH anticipate that evidence of the program's effectiveness will support reimbursement for participant services as well as the expansion of this model of care citywide.

DOHMH has partnered with two New York City health systems, Mount Sinai Medical Center and Montefiore Medical Center, to implement Project INSPIRE at 13 clinical sites. Mount Sinai and Montefiore were chosen as partners because of their expertise in HCV care, their ability to provide holistic care for program participants, and their location in the Bronx or in East or Central Harlem (areas with high rates of HCV).

To be eligible for the program, a person must (1) be at least 18 years old; (2) live in New York City (the Bronx, Harlem, Kings, New York, Queens, and Richmond counties); (3) be eligible for Medicare or Medicaid; (4) have a detectable HCV RNA viral load (in other words, have active HCV infection); (5) consent to participate in the program; and (6) have difficulty keeping appointments, have received sporadic care, or have never been in care, or have requested support. Participants are recruited into the program by care coordinators at Montefiore and Mount Sinai. Care coordinators use the health systems' electronic medical records (EMRs) to identify participants who are eligible for the program.

As stated, Project INSPIRE provides care coordination services to participants. Care coordinators and peer navigators help participants complete HCV treatment by addressing the underlying health problems that commonly interfere with adherence to treatment—including mental health and substance abuse issues—while teaching participants the skills they need to manage their health independently. Care coordinators and peer navigators set up medical appointments and then remind participants about them; offer coaching and coordination services that promote better health; link participants to clinical and non-clinical providers (for example, mental health and substance abuse treatment providers); complete insurance authorizations and related paperwork; and provide other forms of social and instrumental support that help participants adhere to treatment. The peer navigators, who assist the care coordinators, are often from the community they serve and may have previously had HCV and received treatment.

Project INSPIRE also provides tele-mentoring for primary care and other providers to increase their capacity to treat HCV. Both health systems facilitate weekly training and the exchange of information among hepatologists and program providers through tele-medicine, a process DOHMH refers to as tele-mentoring.

DOHMH is working with the partnering payers Healthfirst and Visiting Nurse Service of New York (VNSNY) CHOICE to create and test a payment model. The payment model will provide three payments—at the start, during, and following completion of treatment.

DOHMH hopes to serve 3,200 participants by the end of the three-year cooperative agreement. The awardee anticipates that Project INSPIRE will result in a sustained viral response (SVR), or HCV cure, among 90 percent of non-cirrhotic participants and among 50 percent of cirrhotic participants. By addressing the underlying health problems that commonly interfere with adherence to treatment, including mental health and substance abuse issues, DOHMH hopes to achieve satisfaction among 80 percent of participants and to reduce the number of new episodes of acute care. Project INSPIRE's expected outcomes are to reduce Medicare and Medicaid costs, as indicated by total expenditures, hospitalizations, hospital readmissions, and emergency department (ED) visits, by (1) preventing HCV infection from advancing to hepatocellular carcinoma or other forms of liver disease; (2) stabilizing and managing participants during the program; (3) improving participants' self-sufficiency by facilitating the treatment and management of comorbid conditions, such as HIV, substance abuse disorders, mental health disorders, diabetes, and heart disease; and (4) preventing repeated treatment for HCV by avoiding treatment failures and reinfections.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Fund for Public Health in New York during the first year of its cooperative agreement.

- DOHMH engaged clinical partners with expertise in HCV treatment and large numbers of untreated HCV-positive participants.
- Partnering health systems effectively integrated non-clinical staff into participating clinics' diverse staffing structures and workflows.
- Partnering health systems mobilized telemedicine to increase the capacity of providers to treat HCV effectively.

We also identified several initial challenges in implementing the program and the strategies used by the Fund for Public Health in New York to address them.

- Training non-clinical staff took longer than anticipated, which meant that the health systems had to catch up on enrollment.
- Health promotion materials were too complex and inappropriately worded for the target population, leading DOHMH to bring in a health literacy expert to guide revisions.

Finally, we identified several early lessons learned by the Fund for Public Health in New York in implementing its program.

- Organizations developing health initiatives that entail the use of partner organizations and non-clinical staff should allocate more time for program start-up, including contracting and training staff.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Fund for Public Health in New York made progress in the following areas:

- The Fund for Public Health in New York reached 68.8 percent of its three-year projected enrollment target.
- Project INSPIRE activities are fully implemented, including care coordination, integrated care, and tele-mentoring.
- DOHMH is working with partners to test and refine its payment model. The next steps are to present the payment model to each partnering health system and engage other Medicaid and commercial payers in New York City.

Over the past year, the Fund for Public Health in New York also made several changes to its program.

- Health promotion materials are now delivered in a conversational manner and are tailored to a participant's needs.
- DOHMH reduced the care coordinators' caseloads by allowing the clinical sites to disenroll participants who were unable to begin treatment within three months of enrollment.
- Peer navigators are now required to have a high school diploma to ensure that they can comprehend and master the program information.

Below we note the key challenges that the Fund for Public Health in New York has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Although both of the partnering health systems continue to meet their quarterly target enrollments, they have begun to exhaust their referral pools. The health systems are taking various steps to expand their referral networks.
- Care coordinators are enrolling and engaging an increasingly difficult-to-reach target population. Care coordinators, with the assistance of peer navigators, collect extensive contact information, including locator information, and conduct intense care coordination to ensure that enrollees do not drop out of the program during treatment.
- Once enrolled in Project INSPIRE, completing the program can take a maximum of nine months. Pending approval from CMS, DOHMH will end enrollment in February 2017 to ensure that all participants are able to complete the program and that DOHMH is able to track their outcomes prior to the end of the cooperative agreement.

As the Fund for Public Health in New York enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Identifying funding to sustain Project INSPIRE without eliminating any of its components
- Engaging senior leaders at partnering health systems and convincing them to sustain Project INSPIRE through an agreed upon payment model

Table 1. Fund for Public Health in New York: Project INSPIRE characteristics at a glance

Program characteristic	Description
Purpose	DOHMH intends to facilitate HCV treatment for participants by improving clinical and non-clinical care for both HCV and comorbid conditions and by using tele-mentoring to increase the capacity of health care providers to effectively treat HCV.
Components	• Care coordination • Integrated care • Telemedicine
Target population	HCV-positive individuals with a detectable HCV RNA viral load who were born between 1945 and 1965; who reside in the Bronx or in East or Central Harlem in New York City; who are eligible for Medicare or Medicaid; and who have difficulty keeping appointments, have received sporadic care, or have never been in care, or who have requested support. Other adults age 18 and older who live in the five boroughs of New York City may also participate, although they are not being actively recruited.
Theory of change/theory of action	• Improve HCV cure rates by increasing access to treatment, offering care coordination and health promotion services, and addressing comorbid conditions that can interfere with HCV treatment • Improve participant satisfaction by using a patient-centered service model • Decrease expenses by reducing the need for costly health interventions associated with complications of HCV or comorbid conditions
Payment model	Value-based payments, shared savings, bundled or episode payment, capitated payment for care management/coordination services
Award amount	$9,948,459
Launch date[a]	January 15, 2015
Setting	Health systems (Mount Sinai and Montefiore)
Market area	Urban
Market location	New York City
Outcomes	• SVR or HCV cure rate • Participant satisfaction • Episodes of acute care for behavioral conditions

[a]After the initial planning period, the awardee's program began to operate as of this date.

DOHMH = Department of Health and Mental Hygiene; HCV = hepatitis C virus; SVR = sustained viral response

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by DOHMH in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 25 to August 1, 2016. For the analyses of DOHMH's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at DOHMH
- Frontline staff at Montefiore and Mount Sinai
- Partnering payer

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the awardee's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

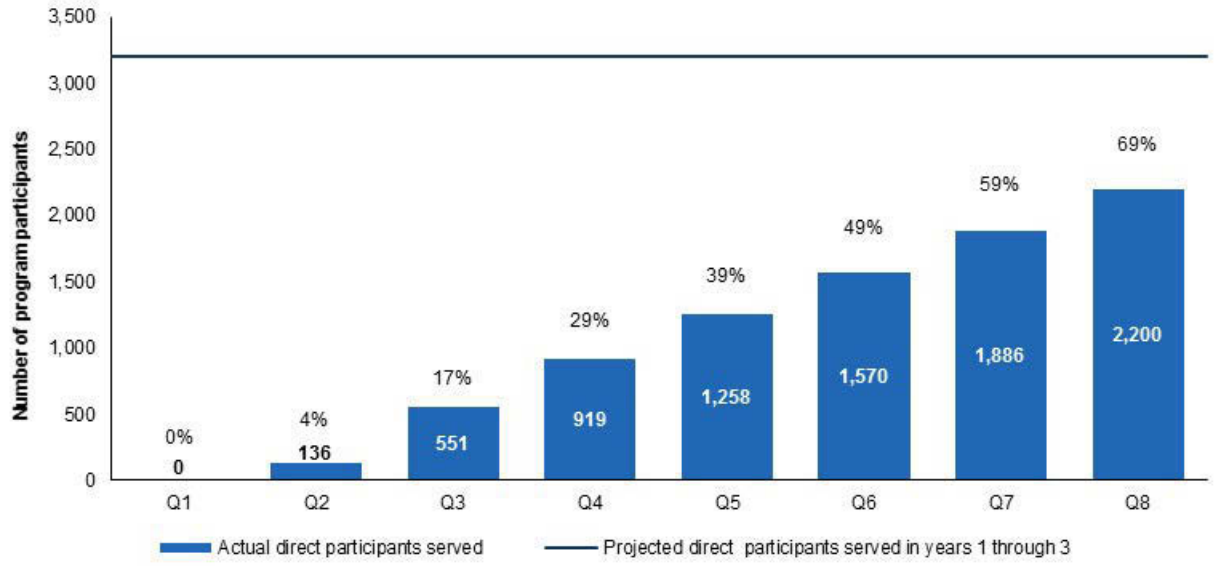
A. Program enrollment

Overall, the Fund for Public Health in New York reported to the implementation and monitoring contractor that it directly served 2,200 participants from January 2015 (the launch of its program) through August 2016, which represents about 69 percent of its 3,200 projected

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

direct participants (Figure 1). The Fund for Public Health in New York continues to meet its enrollment targets. The baseline characteristics of participants who we can identify in Medicare and in Medicaid fee-for-service (FFS) enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. FPHNY does not have indirect program participants.

The awardee's progress toward its three-year enrollment goal was influenced by several factors. These factors include the presence of physician champions in participating clinics, expanding EMR capabilities, exhausting the pool of potential participants within the 13 participating clinics, and disenrolling participants after three months in the program if they had not initiated treatment.

Physician champions continue to be an important facilitator of enrollment, specifically the outreach efforts of physician champions at Montefiore and Mount Sinai to secure buy-in for Project INSPIRE. Interviewees noted that physicians are more receptive to outreach from fellow physicians and thus are more likely to refer their participants to Project INSPIRE based on a presentation from a physician leader, rather than other program staff.

> "I didn't expect it to be so hard to keep up with enrollment. I thought it would just be about . . . running the ship, rather than making sure we're getting the numbers."
>
> — *Montefiore physician champion*

Montefiore is further enhancing its EMR capabilities to support enrollment and improve HCV care. In Year 1, Montefiore installed EMR testing prompts to encourage providers to test

participants for HCV. In Year 2, the health system is developing an additional EMR screener to identify participants specifically born between 1945 and 1965 who do not have an HCV test on file. The EMR system will then prompt the participants' providers to test for HCV. Montefiore also plans to add prompts that provide evidence-based guidelines for HCV care.

Mount Sinai and Montefiore have begun to exhaust their participant referral pools. In Year 1, both health systems had queues of participants who were eligible for the program and ready to begin treatment. In Year 2, the health systems encountered participants who were challenging to enroll and initiate treatment for because of their comorbidities and social service needs (for example, homelessness). To expand their referral pools, the health systems have begun outreach to participants in their inpatient settings. Mount Sinai and Montefiore are also working to establish new referral partnerships with community-based organizations. For example, Mount Sinai is developing a partnership with Beth Israel's methadone program. Montefiore also reported receiving a small number of referrals from participants who were enrolled in Project INSPIRE. The Montefiore care coordinator suspects that these referrals are a result of participants sharing their positive experiences. Mount Sinai recently acquired a new clinical site, which could also potentially expand the referral pool. The health systems also continue to use surveillance reports from DOHMH to identify participants who have been newly diagnosed with HCV within their health systems.

DOHMH is making changes to enrollment processes and timelines to better accommodate the project's goals. DOHMH revised its enrollment protocol to provide sites with guidance on disenrolling participants who are unable to begin treatment within three months of enrollment, in order to reduce the care coordinators' caseloads. DOHMH also developed guidance for tracking and re-enrolling participants. As of June 2016, 2 percent of participants (n = 49) have been disenrolled and then re-enrolled in the program. Pending approval from CMS, DOHMH is planning to end enrollment in February 2017 to ensure that all participants are able to complete the program and that DOHMH is able to track their outcomes prior to the end of the cooperative agreement.

> "We're working with much higher-need participants now. They have a lot more comorbidities. Hepatitis C might not be their focus at the moment. We've recruited over 700 participants now. It's kind of hard to find those ones that we haven't already worked with or they aren't working with another care coordination program."
>
> *— Mount Sinai project manager*

B. Implementation of the service delivery model

The Fund for Public Health in New York has fully implemented Project INSPIRE. Of all participants deemed eligible for treatment by an HCV clinical provider by the eighth program quarter, 78 percent had, according to the awardee, initiated treatment. Ninety-two percent of participants who initiated treatment between January 2015 and February 2016 have completed treatment. Three percent are on a longer, 24-week treatment plan but are on track to complete treatment before the end of the cooperative agreement, while three percent stopped treatment early.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Project INSPIRE is being implemented with a high level of fidelity to the original project plan. DOHMH reported that high project fidelity is a result of a well-formulated plan that incorporated an evidence-based HIV care management model. Using an evidence-based HIV care management model reduced the need for adaptations to the project plan after implementation began. The few adaptions included minimal revisions to the evidence-based health promotion material used by the care coordinators.

Project INSPIRE's tele-mentoring has enabled primary care providers to begin providing HCV treatment to participants in a primary care setting. Prior to tele-mentoring, primary care providers at Mount Sinai and Montefiore rarely treated HCV themselves, instead referring participants to specialists, due to unfamiliarity with the treatment and participant population. Tele-mentoring increased the familiarity of primary care providers at both clinical sites with HCV, treatment, and the population. Tele-mentoring also offers continuing medical education credits, which has facilitated provider engagement and certification of primary care providers as approved HCV drug therapy prescribers in New York State.[3] During the Year 2 telephone interviews, the DOHMH and both clinical partners reported that primary care providers were not only treating more participants with HCV but also leading tele-mentoring sessions. Tele-mentoring sessions have evolved from teaching sessions to case conferencing, with presentations and group discussions of particular HCV cases.

2. Implementation processes

DOHMH provides monthly data reports to the partnering health systems to help them identify any necessary process improvements and to ensure fidelity to the original product plan. The data report includes updates on enrollment numbers and on the progress of program participants. These data reports provide frequent feedback, help keep staff accountable, and contribute to the high fidelity. Reinforcing this finding, DOHMH has reported no major changes to Project INSPIRE since the Year 1 site visit.

Care coordinators and peer navigators adjusted care coordination activities to keep participants engaged after enrollment. Care coordinators adjusted the delivery of health promotion modules to be more conversational and only cover topics relevant to the participant

[3] See https://www.health.ny.gov/health_care/medicaid/program/dur/hepa_c_virus.htm.

(for example, they do not offer smoking cessation modules to nonsmokers). Peer navigators at Mount Sinai also keep participants engaged by escorting participants to clinic appointments, helping participants schedule same-day clinic and lab appointments to reduce the number of clinic visits, sending cards to participants after major holidays, and sending letters to anyone lost to follow-up or who has been disengaged for three or more months. One additional change was made to staffing requirements. Peer navigators are now required to have a high school diploma. This change was made to ensure that peer navigators could master the program information, as well as display professionalism and computer literacy, to be able to guide participants through the program. These adjustments may account for the care coordinators' success in keeping participants engaged and treatment adherent—defined as a participant taking greater than 80 percent of the prescribed medication.

3. Organizational and external context

The organizational characteristics that influenced the implementation of Project INSPIRE included (1) dedicated care coordinators, (2) partnering institutional review boards (IRBs), (3) the payers' prior authorization process, and (4) the awardee's partnership with Weill Cornell Medical College.

Staff at the Fund for Public Health in New York attributed successful implementation of Project INSPIRE to the care coordinators' hard work and dedication to the program. During the Year 2 site visit, interviewees identified care coordinators and peer navigators as an integral part of the care team and the implementation progress. Care coordinators facilitate communication between providers and participants and guide participants through the program. After finding that participants could be difficult to reach after enrollment, care coordinators and peer navigators made minor adjustments to their approach to engaging participants in the second program year. Care coordinators and peer navigators began collecting more detailed contact and location information to ensure that care coordinators could follow up with participants. For example, care coordinators at Mount Sinai use a locator form that includes all of a participant's phone numbers and any possible points of contact, including phone numbers for drug and mental health counselors and locations where the participant may be found if not at home.

> "They're working effortlessly day in, day out to make sure that they're getting these participants, keeping them engaged, and advocating on their behalf."
>
> *— Mount Sinai project manager*

As we reported in the first annual report, lack of space for non-clinical staff posed a significant obstacle to implementing care coordination services. Mount Sinai addressed the issue by designating a work space in each clinic for care coordinators and peer navigators to conduct enrollment and care coordination activities.

Obtaining IRB approval at Mount Sinai has continued to cause implementation delays. During the Year 1 site visit, program staff at Mount Sinai reported delays with implementing Project INSPIRE due to the medical center's lengthy IRB approval process. IRB approval was eventually granted. During the Year 2 site visit, respondents reported additional delays with implementing the participant satisfaction survey because of Mount Sinai's lengthy IRB approval process. DOHMH changed the data collection method from phone surveys to paper surveys to expedite the IRB process. DOHMH was aiming to begin data collection in August 2016.

Negotiating payer approval has continued to cause delays in implementation since the first annual report. In some instances, the participant enrollment period has lasted up to nine months due to numerous submissions of prior authorization applications. However, program staff have reported that the process is improving. Improvements are attributed to care coordinators becoming more familiar with the process of submitting and resubmitting prior authorization applications. Program staff also reported that the increasing availability of a variety of HCV medications reduces costs for payers, which may reduce the length of the approval process. Mount Sinai attempted to streamline the process by having all prior authorization applications submitted through one designated pharmacy. Care coordinators also call participants and their primary care provider to keep them updated on the status of an application. Program staff said that keeping participants updated reassures them of the progress being made toward approval of their treatment and keeps them engaged in the project.

> "At Mount Sinai, they now have a designated specialty pharmacy. And so they work with Acaria [Health] specifically for hepatitis C treatment, and so that allows for one point person. [The pharmacist] is on site actually for the liver specialties clinic for Tuesdays and Thursdays to work on the prior authorizations for all of the participants."
>
> *— Care coordinator*

C. Development of the payment model

DOHMH, Healthfirst, and VNSNY continue to develop and test the payment model so that DOHMH can sustain Project INSPIRE at both Mount Sinai and Montefiore after the cooperative agreement ends. DOHMH is completing a cost and impact analysis to assess the proposed payment model and Project INSPIRE's sustainability. Instead of including incentive payments for various milestones, the model includes incentives for just three milestones. The first payment will cover costs associated with enrollment, assessment, and treatment for HCV. The second payment will follow completion of treatment. A bonus payment will be made when a participant returns for a confirmatory test and achieves an SVR or cure. The payment model also proposes that there be incentives for providers to end failing treatment before all three doses have been administered. VNSNY noted that the incentives are important for both providers and participants to motivate them and to maintain the success rate.

> "We thought about basically providing payments for the various milestones like getting a comprehensive assessment completed, a medical evaluation completed, determining treatment eligibility, getting a participant to initiate treatment and making sure they complete [treatment], and then making sure they come back to find out if they really are cured."
>
> *— Partner payer*

DOHMH solicited feedback from payers as they developed the model. Based on feedback from Healthfirst, DOHMH simplified the payment model. Healthfirst and VNSNY recently received and analyzed their beneficiary data to compare cost and service utilization among their beneficiaries who are and are not enrolled in Project INSPIRE.

> "[We] went out to Montefiore and met with the site where care is provided and had a very, I think, productive discussion about how the model works and what might be necessary to ensure that the model is sustained once the grant ends in 2017. Of course, that led to our development of the payer methodology for episodic care of hepatitis C."
>
> *— Payer partner*

DOHMH also recently hired a health economist, who will conduct a cost analysis in the upcoming year to show the cost and outcome impacts of Project INSPIRE.

As DOHMH works with payers to develop an initial payment model, Project INSPIRE staff at both health systems are trying to garner senior leaders' buy-in to initiate payment methodology negotiations between the health systems and the payers. The project coordinator at Montefiore met with senior leaders at the medical center during the eighth program quarter to get buy-in on Project INSPIRE before beginning payment model discussions with payers. The project manager at Mount Sinai is also planning to engage senior leaders at Mount Sinai about sustaining the program there. The project manager has taken the initial step of setting up a meeting to discuss the payment model with Healthfirst. In addition, VNSNY conducted a site visit to Montefiore to discuss the payment model.

The efforts of the Fund for Public Health in New York to develop its payment model are happening at an opportune time. New York State is moving toward value-based payment models, a move that aligns with the DOHMH payment model because the model is not only value-based but also incorporates risk sharing.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE AND MEDICAID ENROLLMENT AND CLAIMS DATA

This section includes a summary of both core and awardee-specific claims-based outcomes at baseline. For the purpose of our evaluation, the treatment group consists of beneficiaries who are in Medicare fee-for-service (FFS), Medicaid FFS, or Medicaid managed care and who were enrolled in Project INSPIRE (according to lists from the awardee) at some point between its start in January 2015 through June 30, 2015, for Medicaid enrollees, or through May 31, 2016, for Medicare FFS enrollees. The Medicaid analysis is limited to beneficiaries enrolled through June 30, 2015, as opposed to May 31, 2016, due to the lag in Medicaid data. Medicare managed care beneficiaries are excluded from the analysis due to lack of data availability.

The Fund for Public Health in New York began to enroll Medicare and Medicaid beneficiaries into the Project INSPIRE program in January 2015. As of the end of May 2016, the program had 1,886 participants. Baseline characteristics are presented separately for Medicare FFS beneficiaries versus Medicaid beneficiaries in Sections A and B below, respectively.

A. Baseline characteristics of the treatment group: Medicare FFS beneficiaries

In presenting the baseline characteristics for Medicare FFS beneficiaries, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded patients who did not meet the above criteria, 220 Medicare FFS participants (out of 615 total Medicare participants, FFS and managed care, enrolled through May 31, 2016) were included in the analysis of baseline characteristics for this report. The vast majority of Medicare beneficiaries who were excluded from the analysis were in Medicare managed care during their month of enrollment.

The Medicare FFS beneficiaries who are participating in Project INSPIRE are fairly typical of patients with hepatitis C nationwide[4] in terms of demographics and health status characteristics (Table 2). The most common characteristics of participants include being younger than 65 (45 percent); male (65 percent); black (47 percent); originally entitled to Medicare through disability (56 percent, relative to a national average of 24 percent); and dually eligible (56 percent, relative to a national average of 18 percent). A less common characteristic is being originally entitled to Medicare through end-stage renal disease (ESRD) (4 percent). None of the participants are enrolled in hospice. They have a mean hierarchical condition categories (HCC)

[4] As with our sample, black populations nationwide include high proportions of people with hepatitis C. In addition, as with our sample, males are more likely than females to have hepatitis C. See Armstrong, G. L., A. Wasley, E. P. Simard, G. M. McQuillan, W. L. Kuhnert, and M. J. Alter, "The Prevalence of Hepatitis C Virus Infection in the United States, 1999 through 2002." *Annals of Internal Medicine,* vol. 144, no. 10, 2006, pp. 705–714.

risk score of 2.07 (relative to a national mean risk score of 1.00), a median risk score of 1.60, a 25th percentile risk score of 1.09, and a 75th percentile risk score of 2.58. Taken together, the scores indicate that the participants are substantially sicker than the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 220)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	99	45
65 to 74	105	48
75 to 84	16	7
85 and older	0	0
Gender		
Female	76	35
Male	144	65
Race		
White	77	35
Black	103	47
American Indian, Alaska Native, Asian/Pacific Island American, or other	6	3
Hispanic	32	15
Original reason for Medicare eligibility		
Old age and survivor's insurance	88	40
Disability insurance benefits	123	56
ESRD[a]	9	4
Hospice[b]	0	0
Medicare/Medicaid dual status, percentage dual[b]	123	56
HCC score[c]		Statistic
Mean		2.07
25th percentile		1.09
Median		1.6
75th percentile		2.58

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary signed up for the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Consistent with the high HCC scores, participants had high baseline expenditures (Table 3). We examined the baseline cost of care by calculating average per beneficiary per month (PBPM)[5] Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $2,364 (relative to a national average among all Medicare FFS beneficiaries of $792 in 2014). The average PBPM Medicare payments were $1,143 for acute inpatient services (relative to a national average of $263); $483 for outpatient services (relative to a national average of $107); and $359 for physician services. There was not a clear pattern in quarterly expenditures over time, though expenditures did peak in quarter 4.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	220	193	205	220	220
Average Medicare expenditures PBPM[a]					
Total	2,364 (276)	2,107 (358)	2,420 (406)	2,318 (382)	2,547 (397)
Acute inpatient	1,143 (168)	914 (254)	1,223 (283)	1,108 (282)	1,299 (279)
Inpatient other[b]	64 (32)	100 (56)	0 (0)	122 (90)	33 (24)
Outpatient[c]	483 (84)	424 (73)	590 (133)	441 (88)	460 (92)
Physician services	359 (29)	349 (38)	380 (39)	339 (40)	360 (38)
Home health	73 (16)	66 (29)	75 (22)	59 (34)	90 (21)
Skilled nursing facility	211 (78)	236 (117)	120 (62)	210 (140)	274 (190)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	30 (8)	17 (7)	32 (16)	39 (19)	31 (13)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	780 (113)	577 (131)	921 (195)	823 (181)	782 (142)
Outpatient ED visits	956 (182)	855 (199)	1,182 (309)	898 (319)	891 (191)

[5] All national data in this paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Observation stays	29 (11)	43 (29)	60 (34)	19 (18)	0 (0)
Primary care visits in any setting	6,553 (632)	6,391 (993)	6,769 (1,001)	6,023 (854)	6,694 (638)
Primary care visits in ambulatory settings	4,578 (471)	4,916 (856)	4,686 (810)	3,965 (436)	4,493 (403)
Specialist visits in any setting	15,929 (1,170)	14,941 (1,292)	15,862 (1,471)	15,095 (1,334)	17,154 (1,441)
Specialist visits in ambulatory settings	12,248 (990)	11,885 (1,009)	12,137 (1,175)	11,447 (965)	12,970 (1,052)
Measures of any health care utilization					
Percentage with a hospital admission[d]	38 (3)	11 (2)	16 (2)	14 (2)	15 (2)
Percentage with an outpatient ED visit[e]	35 (3)	14 (2)	16 (2)	11 (2)	15 (2)
Percentage with an observation stay[f]	3 (1)	1 (1)	2 (1)	0 (0)	0 (0)
Percentage with a 30-day readmission among all discharges	31 (4)	23 (9)	20 (6)	41 (8)	34 (7)
Percentage of participants with a readmission among all participants	11 (2)	2 (1)	3 (1)	3 (1)	5 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

As would be expected for a relatively sick population, the participants generally had high rates of service use during the baseline year. The rate of acute care hospitalizations was 780 per 1,000 Medicare FFS beneficiaries per year—higher than the national average among all FFS beneficiaries of 274 per 1,000 beneficiaries per year in 2014. Thirty-eight percent of participants had at least one hospitalization in the baseline year.[6] Similarly, the percentage of discharges with a 30-day readmission among participants (31 percent per discharge) in the baseline year was higher than the national average in 2014 for Medicare beneficiaries (18 percent per discharge). The rate of emergency department (ED) visits (inpatient and outpatient) of 956 per 1,000 Medicare FFS beneficiaries per year was also higher than the national average in 2014 of 652 per 1,000 beneficiaries per year. Thirty-five percent of participants had at least one ED visit in the baseline year. The rate of ambulatory observation bed stays was 29 per 1,000 beneficiaries per year (lower than the national average in 2014 of 58 per 1,000 beneficiaries per year).[7] At baseline, the rate of primary care visits in any setting was 6,553 per 1,000 Medicare FFS beneficiaries per year; 70 percent occurred in an ambulatory setting. The rate of specialty care service use in any setting was 15,929 per 1,000 Medicare FFS beneficiaries per year; 77 percent occurred in an ambulatory setting. There was not a clear trend over time, though utilization for many services spiked in quarter 2. Overall, participants had higher expenditures, a higher rate of acute care hospitalizations, and a higher rate of readmissions relative to the national averages for all Medicare FFS beneficiaries. These findings indicate that there may be the potential for improving the care of participating beneficiaries.

Project INSPIRE is expected to have a fairly high proportion of participants with mental health or substance abuse problems, as these are problems commonly associated with people with hepatitis C nationwide.[8,9] Table 4 presents measures specific to Project INSPIRE, including two that relate to mental health and substance abuse. The rate of ED visits for mental health or substance abuse was 146 per 1,000 Medicare FFS beneficiaries per year. The rate of hospital admissions for mental health or substance abuse was 107 per 1,000 Medicare FFS beneficiaries per year.

[6] All national data in this paragraph except for ambulatory observation bed stays are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

[7] MedPAC, "A Data Book: Health Care Spending and the Medicare Program," Washington, DC, June 2015.

[8] For information regarding substance abuse data, see "The Prevalence of Hepatitis C Virus Infection in the United States, 1999 through 2002." Available at http://annals.org/article.aspx?articleid=723191.

[9] For information regarding mental health data, see "Neuropsychiatric and Psychosocial Issues of Patients with Hepatitis C Infection: A Selective Literature Review." Available at http://hepatmon.com/?page=article&article_id=8340.

Table 4. Measures specific to the awardee for Medicare FFS beneficiaries enrolled in the program through May 31, 2016

Types of utilization measures	12 months before enrollment	Utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	220	193	205	220	220
Health care utilization rates (annualized per 1,000)					
ED visits for mental health or substance abuse—primary diagnosis[a]	146 (62)	86 (54)	260 (185)	150 (129)	91 (48)
Hospital admissions for mental health or substance abuse—primary diagnosis, all hospitals[a,b]	107 (33)	64 (36)	120 (83)	112 (51)	127 (47)
Hospital admissions among those with a comorbid condition[c]	937 (132)	689 (141)	1,058 (223)	972 (206)	1,006 (178)
Other health status and utilization measures					
Percentage of participants with any hospital admission among those with a comorbid condition	44 (4)	14 (3)	18 (3)	17 (3)	19 (3)
Percentage with cirrhosis of the liver	50 (3)	11 (2)	12 (2)	15 (2)	19 (3)
Percentage with a liver transplant	3 (1)	3 (1)	3 (1)	2 (1)	2 (1)
Percentage with hepatocellular carcinoma	10 (2)	3 (1)	3 (1)	3 (1)	4 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as the 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.
Standard errors are shown in parentheses.

[a]The search for mental health and substance abuse diagnoses is limited to the primary diagnosis on the claim.

[b]Unlike the acute hospital admissions measure in Table 3, the measure for hospital admissions for mental health or substance abuse includes rehabilitation, long-term care, and psychiatric hospitals.

[c]Comorbid conditions refer to HIV, substance abuse disorders, mental health disorders, diabetes, and heart disease.

ED = emergency department; FFS = fee-for-service

The Fund for Public Health in New York expects the program to reduce the number of hospitalizations among those with comorbid conditions[10] by 30 percent, compared with what it would have been absent the program. The awardee also expects that the reduction in hospitalizations among those with comorbid conditions will be a result of achieving the program goals, which include (1) improving hepatitis C virus (HCV) cure rates among participants; (2) facilitating better care for individuals with HCV and comorbid conditions by using an integrated, patient-centered service model; and (3) reducing expenses related to preventable hospitalizations, ED visits, and HCV-related medical complications. As shown in Table 4, the rate of acute care hospitalizations among those with a comorbid condition was 937 per 1,000 Medicare FFS beneficiaries per year, with 44 percent of these beneficiaries having at least one hospitalization in the baseline year. Given the relatively high rate of acute care hospitalizations among those with comorbid conditions, there may be potential to improve the care for this subpopulation.

Hepatitis C can lead to liver problems such as cirrhosis, liver transplantation, or hepatocellular carcinoma. Table 4 shows that the percentage of participants in the baseline year with a diagnosis on a Medicare claim for each of these conditions was 50 percent, 3 percent, and 10 percent, respectively.

B. Baseline characteristics of the treatment group: Medicaid beneficiaries

In presenting the baseline characteristics for Medicaid beneficiaries, we included both Medicaid FFS and Medicaid managed care beneficiaries. Similar to the restrictions imposed on the Medicare FFS beneficiaries, we restricted the treatment group to Medicaid beneficiaries who were enrolled in Medicaid when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to have been enrolled in the awardee's program on or before June 30, 2015. After we excluded participants who did not meet the above criteria, 552 Medicaid participants (out of 1,669 total Medicaid participants enrolled through May 31, 2016) were included in the analysis of baseline characteristics for this report. The vast majority of the Medicaid participants excluded from the analysis were those who enrolled after June 30, 2015.

Baseline demographic characteristics are presented in Table 5 and Table 6 for beneficiaries who enrolled in the program in the first or second quarter of 2015. As shown in Table 5, the most common characteristics of Medicaid participants include being 55 to 64 years old (48 percent), male (61 percent), Hispanic (45 percent), eligible for full Medicaid benefits (97 percent), in the eligibility category of supplemental security income (SSI) Blind/Disabled (52 percent), enrolled in a comprehensive managed care plan (68 percent), non-dual eligible (75 percent), not being enrolled through a Home and Community Based Services (HCBS) waiver (99 percent), and having no third-party insurance (99 percent).

In Table 6, we find that the most common Chronic Disability Payment System (CDPS) categories of Medicaid participants include infectious disease (87 percent), cardiovascular (60 percent), gastrointestinal (55 percent), substance abuse (43 percent), and psychiatric disorders

[10] Comorbid conditions refer to HIV, substance abuse disorders, mental health disorders, diabetes, and heart disease.

(43 percent). Ninety-six percent of participants are in at least one CDPS category. Although only 87 percent of participants had an infectious disease diagnosis in their claims data in the 365-day baseline period, it is anticipated that all participants will have a diagnosis of hepatitis C (which is an infectious disease) in their claims data at some point in time (that is, either in the baseline period or before the baseline period), because hepatitis C is a requirement to be in the demonstration. The high rates of substance abuse (43 percent) and psychiatric disorders (43 percent) are consistent with the high rates for these conditions found among people with hepatitis C nationwide.[11,12] The participants have a mean risk score of 3.01, a median risk score of 2.64, a 25th percentile risk score of 1.78, and a 75th percentile risk score of 3.63.

Table 5. Baseline year demographic characteristics of Medicaid beneficiaries enrolled in the awardee's program through the second program quarter (June 30, 2015)

	All enrollees (N = 552)[a]	
Characteristics	Number	Percentage
Age as of enrollment date		
18–21	1	0.18
22–34	17	3.08
35–44	34	6.16
45–54	164	29.71
55–64	266	48.19
65–74	66	11.96
75–84	4	0.73
Gender		
Female	213	38.59
Male	339	61.41
Race and ethnicity		
White	51	9.24
Black	188	34.06
Asian or Pacific Islander	7	1.27
American Indian, Alaska Native, or other	6	1.09
Hispanic	2	0.36
Hispanic and one or more races	245	44.38
More than one race (not Hispanic)	5	0.91

[11] For information regarding substance abuse data, see "The Prevalence of Hepatitis C Virus Infection in the United States, 1999 through 2002." Available at http://annals.org/article.aspx?articleid=723191.

[12] For information regarding mental health data, see "Neuropsychiatric and Psychosocial Issues of Patients with Hepatitis C Infection: A Selective Literature Review." Available at http://hepatmon.com/?page=article&article_id=8340.

Table 5 *(continued)*

Characteristics	All enrollees (N = 552)[a]	
	Number	Percentage
Type of benefits		
Full Medicaid benefits	536	97.10
Restricted benefits	16	2.90
Medicaid eligibility category		
SSI aged	34	6.16
Non-SSI aged	14	2.54
SSI blind/disabled	289	52.36
Non-SSI blind/disabled	36	6.52
TANF, safety net, or low income family adults	118	21.38
All other adults	61	11.05
Managed care enrollment		
Comprehensive managed care plan	373	67.57
Long-term care carve-out	38	6.88
No managed care enrollment	141	25.54
Medicare/Medicaid dual status, percentage dual		
Dual	140	25.36
Non-dual	412	74.64
HCBS waiver enrollment		
Enrolled in any HCBS waiver	7	1.27
Not enrolled in an HCBS waiver	545	98.73
Third-party insurance		
Third-party insurance	6	1.09
No third-party insurance	546	98.91
Quarter of initial program enrollment		
Q1 2015	208	37.68
Q2 2015	344	62.32
Records included in the expenditure and utilization analysis[b]		
	530	96.01

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of June 30, 2015.

Note: The baseline period is defined as one year (365 days) prior to each individual beneficiary's program enrollment date. Medicaid enrollees must have at least 90 days eligibility in the baseline period and on the date of program enrollment to be included in the eligible sample. All beneficiary characteristics (other than CDPS category and risk score) are measured in the last month of the baseline period.

[a]Excludes Medicaid beneficiaries who have state plan enrollment during the month of program enrollment.

[b]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third-party benefits during the month of program enrollment.

HCBS = Home and Community Based Services; SSI = Supplemental Security Income; TANF = Temporary Assistance for Needy Families.

Table 6. CDPS categories of Medicaid beneficiaries enrolled in the awardee's program through the second program quarter (June 30, 2015)

Characteristics	All enrollees (N = 552)[a]	
	Number	Percentage
Selected CDPS category[b]		
Beneficiaries in one or more CDPS categories	531	96.2
Infectious disease	478	86.59
Cardiovascular	332	60.14
Gastrointestinal	306	55.43
Substance abuse	237	42.93
Psychiatric	235	42.57
Beneficiaries not in a CDPS category	21	3.8
CDPS risk score[b]		
Mean	3.01	
25th percentile	1.78	
Median	2.64	
75th percentile	3.63	

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015.

[a]Excludes Medicaid beneficiaries who have state plan enrollment during the month of program enrollment.
[b]Categories and risk scores are defined using the CDPS software and are based on the ICD-9 codes on Medicaid claims occurring during each beneficiary's one-year baseline period.
CDPS = Chronic Disability Payment System

Baseline expenditure and utilization statistics for Medicaid participants are presented in Table 7 and Table 8 for non-dual status participants (enrolled in Medicaid only) and dual status participants (enrolled in Medicare and Medicaid), respectively. Unlike the beneficiary characteristics presented in Tables 5 and 6, the expenditure and utilization analysis presented in Tables 7 to 9 excludes Medicaid beneficiaries who have partial benefits or third-party benefits during the month of program enrollment (as well as those who have state plan enrollment).

In Table 7, we find that the total average PBPM Medicaid payment among Medicaid non-dual status participants during the baseline year was $4,096. The average PBPM Medicaid payments for non-dual status participants were $687 for acute inpatient stays; $39 for ED visits; $2,390 for pharmacy services; and $979 for other services. The large proportion of total spending accounted for by pharmacy expenditures is consistent with the high cost of the drugs commonly used to treat hepatitis C. There was not a clear pattern in quarterly expenditures over time, though expenditures did rise sharply in quarter 4, driven primarily by a spike in pharmacy spending.[13]

[13] Note that Medicare and Medicaid cover different services so Medicaid and Medicare spending patterns may be quite different. Also, while we report Medicaid prescription drug spending, due to a lack of data availability, we do not report Medicare Part D prescription drug spending.

Table 7 also provides utilization data for the Medicaid non-dual status participants. The rate of acute hospital admissions was 676 per 1,000 Medicaid beneficiaries per year. The rate of ED visits was 1,677 per 1,000 Medicaid beneficiaries per year, with 22 percent (365 of 1,677) leading to an inpatient stay. Both acute hospital admissions and ED visits peaked in quarter 2.

Table 7. Baseline year expenditures and health care utilization for Medicaid non-dual status beneficiaries enrolled in the awardee's program through the second program quarter (June 30, 2015)

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	406	381	395	406	406
Average Medicaid expenditures PBPM[b]					
Total payment	4,096 (251)	3,310 (258)	3,986 (426)	3,446 (294)	5,561 (434)
Acute inpatient stays	687 (104)	573 (107)	961 (232)	585 (126)	633 (144)
Total ED payment	39 (4)	37 (6)	49 (13)	38 (5)	34 (5)
ED visits that lead to an inpatient stay	7 (2)	4 (1)	14 (9)	4 (1)	5 (1)
ED visits that do not lead to an inpatient stay	33 (4)	33 (5)	35 (10)	33 (5)	30 (4)
Pharmacy	2,390 (178)	1,795 (209)	1,880 (236)	1,880 (221)	3,931 (389)
Other[c]	979 (73)	906 (69)	1,095 (142)	944 (108)	962 (83)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	676 (88)	661 (110)	807 (182)	690 (121)	553 (102)
Total ED visits	1,677 (157)	1,694 (210)	1,810 (509)	1,619 (187)	1,589 (199)
ED visits that lead to an inpatient stay	365 (53)	309 (62)	455 (98)	330 (78)	365 (76)
ED visits that do not lead to an inpatient stay	1,312 (134)	1,385 (189)	1,355 (494)	1,290 (162)	1,224 (158)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015. New York State provided Medicaid data for services dated through June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

Table 7 *(continued)*

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third-party benefits during the month of program enrollment.

[b]Total Medicaid expenditures for the baseline year or a given quarter exclude capitated payments. Expenditures were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include non-office visit practitioner services, dental care, eye care, home health care, laboratory services, intermediate care facility services, nursing home services, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

In Table 8, we find that the total average PBPM Medicaid payment among Medicaid dual status participants during the baseline year was $1,676. The average PBPM Medicaid payments for dually eligible participants were $119 for acute inpatient stays; $5 for ED visits; $305 for pharmacy services; and $1,246 for other services. Common other services received by participants include home health, laboratory, intermediate care facility, and clinic services. Spending on these service types will be broken out separately in future reports. For dually eligible beneficiaries, Medicare is typically the primary payer. Thus, the majority of spending for dual eligibles will be paid for by Medicare. In contrast, for non-dual status Medicaid beneficiaries, Medicaid is typically the primary payer. Thus, Medicaid pays for the majority of the services for non-dual status beneficiaries. As a result, the total dual status Medicaid spending ($1,676) is quite low relative to the total non-dual status Medicaid spending ($4,096). There was not a clear pattern in quarterly expenditures over time, though expenditures did obtain their peak values in quarter 1 for many service categories (total expenditures, acute inpatient stays, and pharmacy services).

Table 8 also provides utilization data for the Medicaid dually eligible participants. The rate of acute hospital admissions was 842 per 1,000 Medicaid beneficiaries per year. The rate of ED visits was 1,577 per 1,000 Medicaid beneficiaries per year, with 19 percent (297 of 1,577) leading to an inpatient stay. For both acute hospital admissions and ED visits, the trend in service use over time increases from quarter 1 to quarter 2, decreases from quarter 2 to quarter 3, and increases from quarter 3 to quarter 4.

Table 8. Baseline year expenditures and health care utilization for Medicaid dually eligible beneficiaries enrolled in the awardee's program through the second program quarter (June 30, 2015)

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	124	120	120	124	124
Average Medicaid expenditures PBPM[b]					
Total payment	1,676	2,151	1,274	1,588	1,693
	(295)	(585)	(187)	(438)	(403)
Acute inpatient stays	119	213	79	97	90
	(25)	(85)	(15)	(32)	(22)
Total ED payment	5	6	6	4	6
	(2)	(3)	(2)	(1)	(2)
ED visits that lead to an inpatient stay	0	1	1	0	0
	(< 0.5)	(< 0.5)	(< 0.5)	(< 0.5)	(< 0.5)
ED visits that don't lead to an inpatient stay	5	5	5	3	6
	(2)	(2)	(2)	(1)	(2)
Pharmacy	305	560	272	99	296
	(106)	(280)	(113)	(53)	(192)
Other[c]	1,246	1,372	917	1,388	1,300
	(231)	(457)	(147)	(433)	(287)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	842	774	869	853	871
	(122)	(159)	(158)	(239)	(186)
Total ED visits	1,577	1,346	1,971	1,247	1,742
	(324)	(369)	(610)	(273)	(405)
ED visits that lead to an inpatient stay	297	303	401	230	258
	(61)	(118)	(120)	(95)	(89)
ED visits that don't lead to an inpatient stay	1,280	1,043	1,570	1,017	1,484
	(303)	(328)	(590)	(228)	(387)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015. New York State provided Medicaid data for services dated through June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter is 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and in each baseline quarter according to the number of days that each beneficiary was enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

Table 8 *(continued)*

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third-party benefits during the month of program enrollment.

[b]Total Medicaid expenditures for the baseline year or a given quarter exclude capitated payments. Expenditures were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include non-office visit practitioner services, dental care, eye care, home health care, laboratory services, intermediate care facility services, nursing home services, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

Project INSPIRE is expected to have a fairly high proportion of participants with mental health or substance abuse problems, as these are problems commonly associated with people with hepatitis C nationwide.[14,15] Table 9 presents measures specific to Project INSPIRE, including two that relate to mental health and substance abuse. The rate of ED visits for mental health or substance abuse was 175 per 1,000 Medicaid beneficiaries per year. The rate of hospital admissions for mental health or substance abuse was 125 per 1,000 Medicaid beneficiaries per year.

The Fund for Public Health in New York expects the program to reduce the number of hospitalizations among those with comorbid conditions[16] by 30 percent, compared with what it would have been absent the program. As shown in Table 9, the rate of acute care hospitalizations among those with a comorbid condition was 773 per 1,000 Medicaid beneficiaries per year. Given the relatively high rate of acute care hospitalizations among those with comorbid conditions, we believe there is potential to improve the care for this subpopulation.

Hepatitis C can lead to liver problems such as cirrhosis, liver transplantation, or hepatocellular carcinoma. Table 9 shows that the percentage of Medicaid participants in the baseline year with a diagnosis on a Medicaid claim for each of these conditions was 25 percent, 2 percent, and 2 percent, respectively.

[14] For information regarding substance abuse data, see "The Prevalence of Hepatitis C Virus Infection in the United States, 1999 through 2002." Available at http://annals.org/article.aspx?articleid=723191.

[15] For information regarding mental health data, see "Neuropsychiatric and Psychosocial Issues of Patients with Hepatitis C Infection: A Selective Literature Review." Available at http://hepatmon.com/?page=article&article_id=8340.

[16] Comorbid conditions refer to HIV, substance abuse disorders, mental health disorders, diabetes, and heart disease.

Table 9. Measures specific to the awardee for Medicaid beneficiaries enrolled in the program through the second program quarter (June 30, 2015)

Types of utilization measures	12 months before enrollment	Utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	530	501	515	530	530
Health care utilization rates (annualized per 1,000)					
ED visits for mental health or substance abuse—primary diagnosis[b]	175 (60)	121 (40)	229 (131)	161 (61)	189 (66)
Hospital admissions for mental health or substance abuse—primary diagnosis[b]	125 (44)	105 (43)	158 (96)	146 (51)	91 (32)
Hospital admissions among those with a comorbid condition[c]	773 (81)	758 (102)	885 (161)	780 (119)	669 (98)
Other health status and utilization measures					
Percentage with cirrhosis of the liver	25 (2)	11 (1)	11 (1)	11 (1)	15 (2)
Percentage with a liver transplant	2 (1)	1 (0)	1 (0)	1 (1)	1 (1)
Percentage with hepatocellular carcinoma	2 (1)	1 (0)	1 (0)	1 (1)	1 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015.

Note: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as the 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third-party benefits during the month of program enrollment.

[b]The search for mental health and substance abuse diagnoses is limited to the primary diagnosis on the claim.

[c]Comorbid conditions refer to HIV, substance abuse disorders, mental health disorders, diabetes, and heart disease.

ED = emergency department

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 10: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 10. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Fund for Public Health in New York

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	381
Projected Medicaid population with 6 months of program exposure	2,650
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	5,032
Likelihood of all-cause hospitalizations	1,710
MDE sample size requirement to detect 20% effect	
Total expenditures	1,258
Likelihood of all-cause hospitalizations	428
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	No serious issues. Proceeding with comparison group selection
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician and beneficiary survey
Implementation data that will be analyzed	Data on services used; sustained viral response data

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact analysis. We should be able to construct a valid comparison group by using propensity score matching to select comparison group members who live in New York City, have hepatitis C, and have similar characteristics and service use as program participants. Our sample should be large enough to detect plausible effects on claims-based measures.

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V. NEXT STEPS

A. Implementation evaluation

As the Fund for Public Health in New York enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During these interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact evaluation include estimating a propensity score model and performing propensity score matching. The potential comparison group will consist of Medicare and Medicaid beneficiaries who live in New York City and have a diagnosis of hepatitis C. We may exclude from the potential comparison group both (1) beneficiaries who received care from one of the participating organizations (Mount Sinai or Montefiore) in the baseline period and (2) beneficiaries who live in areas (determined by zip code) where a high proportion of the eligible population is participating in the demonstration (that is, where the penetration rate is high). From the pool of potential comparison beneficiaries, we will use propensity score matching to select comparison beneficiaries who are similar to participants in terms of baseline characteristics, including demographics (for example, gender and age); health status (for example, cirrhosis of liver indicator, hepatocellular carcinoma indicator, and risk score); utilization (for example, number of hospital admissions and number of ED visits); and community characteristics (for example, median family income for zip code of residence). After choosing a comparison group, we will estimate the program's impacts on outcome by using regression models. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering a survey of participants who received services, either directly or indirectly, from Fund for Public Health in New York's program. The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.15.

FOUR SEASONS COMPASSION FOR LIFE

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MATHEMATICA Policy Research

REPORT

APPENDIX B.15

HCIA Round Two Evaluation: Four Seasons Compassion for Life

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Increasing Patient and System Value with Community-Based Palliative Care (CPC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress of Four Seasons Compassion for Life in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Four Seasons made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Four Seasons and its implementation partners addressed the issues identified during the first program year? What factors have influenced the ability of Four Seasons and its implementation partners to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Four Seasons' Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CPC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Four Seasons is a nonprofit hospice and palliative care organization based in western North Carolina that received HCIA R2 funding to expand its community-based palliative care program. The CPC program launched on September 2, 2014, at two sites: Four Seasons and Palliative Care and Hospice of Catawba Valley (PCHCV). Over the first two years of implementation, Four Seasons expanded its service area to three new sites: one site in Asheville, North Carolina, and two sites in Greenville, South Carolina. Four Seasons also collaborates with the Duke Clinical Research Institute to conduct data collection, perform an internal evaluation, and develop a payment model for the CPC program. See Table 1 for more details on the program's characteristics.

Four Seasons set an enrollment target of 8,000 participants by the end of the three-year cooperative agreement. CPC program staff enroll participants at any point throughout the continuum of care. Participants must be 65 years of age or older, be enrolled in traditional fee-for-service (FFS) Medicare, and have a life-limiting illness[2] with a prognosis of one year or less. Referrals to the program may be initiated by the participant's primary care physician, by a hospital or other medical facility, or by participants themselves. Referring physicians receive a paper screening tool developed by Four Seasons to help them identify potential participants. After enrolling eligible participants, program staff send an informational letter that notifies them of their enrollment in the HCIA R2 program. The letter does not ask for the participant's consent. Participants remain enrolled in the program until they are discharged, move to a hospice, or die. Participants may be discharged if they no longer medically need the program, meet their care plan goals, or ask to be discharged.

The CPC care teams integrate inpatient and outpatient care to span all settings that participants with advanced illnesses transition through, such as hospitals, clinics, private residences, nursing homes, and living facilities. The CPC care teams—headed by a nurse-practitioner (NP) or physician's assistant and composed of registered nurses, social workers, and administrative support staff—provide care focused on symptom management, quality of life, psychosocial supports, coordination with community-based resources, advance care planning, and spiritual support.

The program also emphasizes participant, family, and provider education. Four Seasons staff offer educational programs for participants and families on topics ranging from health counseling to the benefits of palliative care. Four Seasons staff also travel to hospitals, nursing homes, physicians' offices, and assisted living facilities to educate clinicians about palliative care, distribute materials, and encourage providers to refer participants to the CPC program (the HCIA R2 funding is supporting these educational efforts).

Four Seasons is using its data and electronic medical record (EMR) systems to track patient status. The data reports are reviewed weekly by an interdisciplinary group composed of a

[2] One common definition of life-limiting illness is by the Center to Advance Palliative Care (CAPC), which is a national, multi-stakeholder organization created by the Robert Wood Johnson Foundation: "any disease/disorder/condition that is known to be life-limiting (for example, dementia, cardiac disease, cancer) or that has a high chance of leading to death."

clinician, a chaplain, and a social worker, who discuss high-acuity patients and recommend interventions for the CPC care teams to manage the patients' care.

Through the provision of high quality, patient-centered, and integrated care as well as education to providers, participants, and their families, Four Seasons aims to (1) reduce hospitalizations by 10 percent, (2) reduce in-hospital deaths by 15 percent, and (3) save over $25 million during the three-year cooperative agreement.

Four Seasons also plans to develop a payment model that will have two parts: a transitional FFS payment structure followed by a bundled, fully capitated payment approach. The FFS model encourages delivery of the palliative care model, with fees calibrated to allow the model to break even financially. During the second year of implementation, Four Seasons and Duke began calculating the precise costs of services and the reimbursement for those services. These calculations will eventually be used to assess the feasibility of financing the model with a bundled payment.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Four Seasons during the first year of its cooperative agreement.

- The awardee achieved high levels of stakeholder engagement and community support for the initiative.
- Program leaders and staff believed that both the training program for staff and the educational campaigns for providers and the community were effective.

We also identified several initial challenges in implementing the program and Four Seasons' strategies for addressing them.

- The awardee experienced slower enrollment than expected, reaching only 44 percent of the Year 1 goal for number of participants. Program leaders attributed slow enrollment to (1) delays in expanding the program to new hospitals, (2) higher rates of ineligibility for the program than predicted, and (3) difficulty recruiting providers. However, the awardee anticipated finalizing agreements with two new implementing hospitals and predicted that those additional sites would help improve the enrollment figures in upcoming quarters.
- Challenges with implementing the Quality Data Collection Tool (QDACT) software limited the awardee's ability to analyze program data. Program leaders planned to focus on analyzing program data once QDACT became fully operational in January 2016, following new software deployment.

Finally, we identified several early lessons learned by Four Seasons in implementing its program.

- The community-based palliative care model requires employing people who are highly skilled and who believe in the value of these services and the mission of the organization.

- Program leaders predicted that twice as many patients would be eligible for the program than were actually eligible, largely due to the growth in participation in Medicare Advantage between the time of application and the implementation of the cooperative agreement.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Four Seasons made progress in the following areas:

- Four Seasons met 58 percent of its enrollment target of 4,800 participants by the end of Year 2. Program leaders acknowledged that they would not be able to meet their three-year enrollment target (8,000 participants) by the end of the cooperative agreement, but expect to reach three-quarters of the target (6,000 participants).
- Four Seasons continued to be on track with implementation of its service delivery model. In the second program year, the three new implementing sites began providing program services and a partnering rural clinic completed the CPC program's first telemedicine encounter.
- Four Seasons continued to work with Duke to analyze data for its payment model. Duke completed a time and motion study to capture the amount of time required and specific costs for delivering program services. Despite this progress, the awardee no longer plans to implement the payment model during the third program year, but instead will simulate the effects of the proposed payment model.

Over the past year, Four Seasons also made several changes to its program:

- The awardee finalized agreements with three new implementing sites—(1) Greenville Health System (GHS), (2) Mission Hospital, and (3) Palliative Care of South Carolina (PCSC)—in addition to the two original sites of Four Seasons and PCHCV. All three new implementing sites began enrolling participants and delivering program services.
- The awardee implemented a telemedicine program at Celo Clinic, a rural clinic in a mountainous region of North Carolina.

Below we note the key challenges that Four Seasons worked to address in the second year of its cooperative agreement.

- There were numerous delays with the legal departments and institutional review boards (IRBs) of the three new implementing sites before the agreements were ultimately finalized.
- The high penetration of Medicare Advantage patients in the awardee's catchment area continued to create challenges with program enrollment. CMS is currently reviewing the awardee's request to include Medicare Advantage patients in its enrollment count.
- Providers' misperceptions about palliative care have also created challenges with program implementation at the new sites. Four Seasons and its implementing partners are increasing their efforts to spread awareness and education about the benefits of the CPC program and palliative care.

- Misperceptions about palliative care among participants and their families have also created challenges in enrollment and service delivery. However, the efforts of Four Seasons and its implementing partners to educate the community have been successful, according to interview respondents. The awardee plans to expand its community outreach efforts by launching a planned patient and family education module.

As Four Seasons enters the final year of its cooperative agreement, it is anticipating the following challenges:

- Concerns that it will be unable to access Medicare claims data on a timely basis
- Concerns that organizations like Four Seasons cannot be financially liable for a fully bundled payment
- Concerns of the Duke researchers that the enrollment numbers are not large enough to effectively test the payment model
- Concerns that three years is too short a time period for a study of end-of-life care to estimate long-term impacts

We discuss the strategies that Four Seasons and Duke will use to address these challenges in Section III.

Table 1. Four Seasons: CPC program characteristics at a glance

Program characteristic	Description
Purpose	Four Seasons Compassion for Life (FSCL) enrolls participants with life-limiting illnesses in the CPC program and provides them with a continuum of services, which focus on integrating care and addressing participant needs. FSCL also seeks to change the behavior of both participants and physicians by educating participants and their families, providers, and communities about palliative care.
Components	• Integrated care • Education and training
Target population	Individuals over the age of 65 years who are enrolled in traditional Medicare and who have a life-limiting illness, usually with a prognosis of three years or less (the HCIA R2 funding is supporting provider education, not care to participants)
Theory of change/theory of action	If a continuum of services is provided that addresses participant needs and integrates care in all the settings through which participants with advanced illnesses transition, then participant outcomes will improve and Medicare costs will be reduced. If participants, families, providers, and communities are educated on palliative care, then the behavior of both participants and physicians will change to increase use of community-based palliative care.
Payment model	New FFS payment, bundled or episode payment
Award amount	$9,569,123
Launch date[a]	September 2, 2014
Setting	Any setting where a participant receives health care, including specialty care clinics, hospitals, long-term care facilities, hospices, primary care practices, or a participant's private residence
Market area	Rural, suburban, urban
Market location	Western NC and Greenville, SC
Outcomes	• 10 percent reduction in hospitalizations for CPC participants • 15 percent fewer hospital deaths among CPC participants • $25,272,000 in total savings on the cost of care for participants who receive the CPC intervention during the three-year cooperative agreement

[a]After the initial planning period, the awardee's program began to operate as of this date.

FFS = fee-for-service

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Four Seasons in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff and implementing partners from July 18 through July 22, 2016. For the analyses of Four Seasons' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at Four Seasons
- Program administrators and physician leaders at the implementing sites
- Clinical program staff at Four Seasons
- Internal evaluation and payment model lead at Duke

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

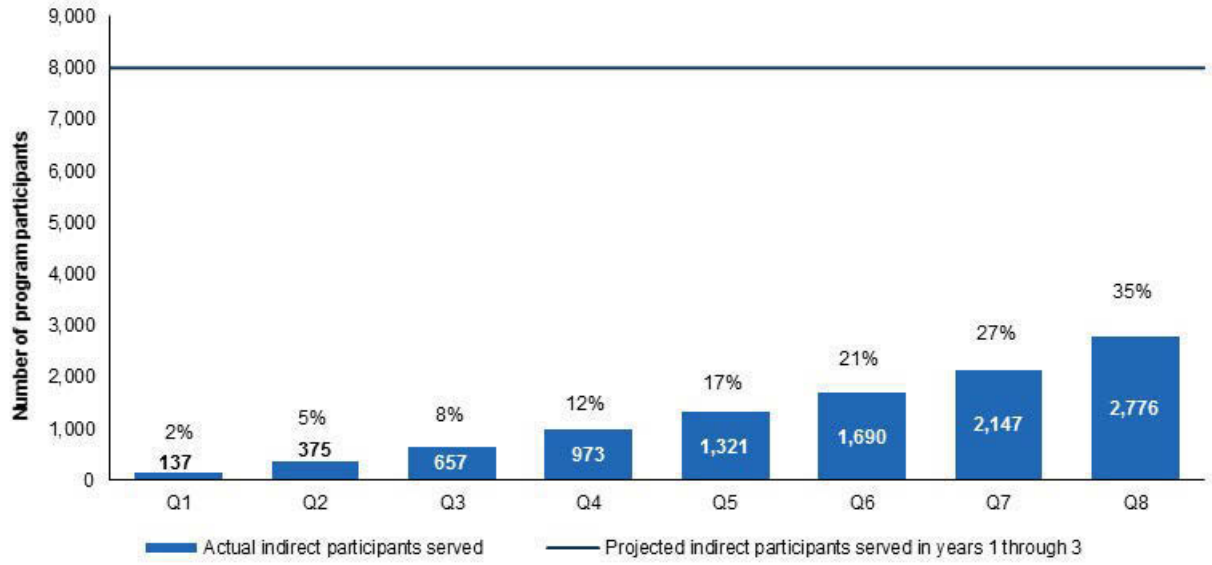
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Four Seasons' implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Four Seasons reported to the implementation and monitoring contractor that it indirectly served 2,776 participants from September 2014 (the launch of the program) through August 2016, which represents about 35 percent of its 8,000 projected indirect participants (Figure 1). Because the HCIA R2 funding is supporting educational programs for clinicians, not care for participants, the program only has indirect participants.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. As noted in the text, FSCL does not have direct participants.

Program leaders acknowledge that they probably will not meet their enrollment targets by the end of the cooperative agreement. They have currently reached about half of their target, and estimate that they will reach about three-quarters of the target (6,000 participants versus 8,000 participants) by the end of three years, based on implementation progress made during the second program year. After facing numerous delays with the legal departments and IRBs of the three new implementing sites, Four Seasons ultimately reached agreements with GHS, Mission Hospital, and PCSC in April, June, and July 2016, respectively. Soon after finalizing these agreements, all three of the new implementing sites began enrolling participants. Four Seasons leaders said that the enrollment numbers met or exceeded the anticipated enrollment at two of the implementing sites: GHS enrolled 184 participants in the first three months and Mission enrolled 44 participants before the end of the first month, putting both hospitals on track to reach their goals of enrolling 50 patients per month. (PCSC only began enrolling patients around the time of our site visit). PCHCV also opened a clinic at a local oncology practice called Carolina

Oncology Associates as well as a clinic on its own campus, both of which serve as new referral sites for participant enrollment.

The original two implementing sites, Four Seasons and PCHCV, improved the efficiency of the enrollment process by documenting standard procedures. Program staff at Four Seasons commented on how the standard procedure documents created during the second year of implementation improved the efficiency of program operations, especially for the participant enrollment process. The standard procedure documents described the proper procedures for participant enrollment and other program operations as well as the responsibilities and roles of different types of staff.

> "We had a lot of referrals coming in and we were having a hard time keeping up with admitting all of those patients. We had a real admissions bottleneck. [The additional triage nurses] save the nurse practitioner about 30 minutes per admission. . . . They feel a lot more satisfied [and can] actually spend time to help their patients."
>
> *— Leader at implementing site*

PCHCV identified a bottleneck in the enrollment process during the first year of implementation, which was due to having more patient referrals than the triage nurses could handle. During the second year, PCHCV resolved the bottleneck by hiring multiple triage nurses. Triage nurses now handle the entire enrollment process, including responding to referrals, educating potential participants about the CPC program, and helping participants fill out paperwork. After hiring additional triage nurses, PCHCV administrators noted that the job satisfaction of their NPs improved because they could focus solely on providing services to participants, rather than dealing with referrals and enrollment.

According to program leaders, the biggest barrier they face in reaching their enrollment target is the high penetration of Medicare Advantage patients in the catchment area. The HCIA R2 evaluation specifies that only Medicare FFS patients count toward the total number of program enrollees, even though Medicare Advantage patients may receive the same CPC program services. PCHCV reported that the high level of Medicare Advantage enrollment is an even greater challenge in its community than in the Four Seasons area. CMS is currently reviewing the awardee's request to include Medicare Advantage patients in its enrollment count.

Program staff we interviewed believed that public misunderstanding of palliative care was the biggest barrier to enrolling participants. However, they said that their community outreach efforts have reduced some of those misperceptions. Four Seasons and PCHCV hold information sessions to educate the community about the benefits of palliative care. PCHCV employs program staff to host the information sessions. Four Seasons employs one full-time staff member who is dedicated to community education. This staff person holds educational sessions at community centers, churches, local malls, the YMCA, and local hospitals, and works to establish long-term relationships with these community partners. Other program staff support these efforts by staffing outreach events, meeting with potential participants, or helping to develop publicity materials. Program staff we interviewed believed that the outreach efforts were successful.

> "As soon as they hear the word palliative care, the patients . . . or the family [think] it's that 'h' word [hospice]. They hear [hospice] even though that's not what it is. I think that still is a market perception."
>
> *— Leader at implementing site*

"Offering education to the community on a grander basis that is more consistent and more often instead of just once a year or once every six months... having that additional education in the community is extremely beneficial," one interviewee said.

> "I had a physician literally say to me, 'Why should I send somebody to palliative care when I can do it myself?' It is that lack of understanding and being able to prove the differences that we make as a palliative care team to everybody else. That is just going to take time."
>
> *— Leader at implementing site*

The new implementing partners have faced unique challenges in engaging referring providers. As a locally known and respected palliative care provider, Four Seasons faced few barriers when engaging local providers. However, at the other sites, which have less mature outpatient palliative care services, providers are more likely to be unfamiliar with and skeptical of the CPC program. Program administrators at the implementing sites reported that their sites would continue efforts to better engage and educate providers through marketing campaigns, open houses, and educational sessions.

B. Implementation of the service delivery model

Four Seasons and its implementation partners continue to be on track with the implementation of the service delivery model. They did not make any significant changes to the model in the second program year. The awardee's major milestones in the second program year included implementing a telemedicine program in a rural clinic, developing program documents that outline standard procedures, and scaling up the program to three new implementing sites. The majority of contacts between program staff and participants continued to be in person during the second program year; the remaining contacts were made by telephone. As of August 2016, the program reported eight encounters via the telemedicine program component.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Characteristics of the CPC program have created both advantages and challenges for implementation. One advantage of the CPC program is that it is adaptable and can be replicated across many different settings. The CPC program began in Hendersonville, North Carolina, a small city in the western part of the state, south of Asheville. In the first two program years, Four

Seasons rolled out the program in two states with diverse settings including—a large urban health system, a major urban hospital, a small rural clinic, and palliative care clinics. One example of the program's adaptability is the implementation of the telemedicine program component, which occurred in the summer of 2016. The telemedicine program component was established in part to lessen the burden of the stressful and time-consuming commute that providers faced to see participants in rural, mountainous Yancey County in North Carolina.

> "The biggest lesson learned that I keep coming back to is setting. There are so many different settings; it makes it difficult sometimes to really come up with a process that is replicable. There are slightly different processes for rural settings especially."
>
> *— Program leader*

Program leaders noted, however, that different settings have different needs for community-based palliative care. This lack of uniformity has made it difficult for program leaders to anticipate whether standard procedures can be replicated in a new setting. Four Seasons has been able to overcome this challenge by working with each implementing site to adapt the program to the setting. For example, program leaders talked about the importance of having a nurse in rural implementing sites who can handle more responsibility because of the shortage of palliative care providers in rural areas.

2. Implementation processes

During the second program year, Four Seasons focused on implementing new data collection software, collecting data to inform the development of the payment model, and enhancing communication with and training for its partners. Implementing the new data collection software, Vision Tree, will allow Four Seasons to perform sophisticated self-monitoring of the program by using participant data. Vision Tree allows leaders at all implementing sites to pull and analyze data for their site. Four Seasons, which was able to retrieve reports toward the end of the second program year, established a Quality Data and Analytics Team. In response to the team's early analyses, the awardee began implementing small changes to service delivery and it plans to begin tracking any resulting changes to participant outcomes. For example, participants with moderate to severe blood abnormalities will be receiving extra phone calls from nurses to see if their satisfaction and other scores improve over time.

> "Now that the Vision Tree tool is getting where it is really usable and you can pull data out . . . [we're] starting to really look at the data. . . . I am pleased where things are now. Ultimately, we got a much better product and now we have paid for some modifications so that we can pull our own reporting."
>
> *— Program leader*

As the CPC program's internal evaluator, Duke is an important resource that facilitates the awardee's ability to self-monitor and evaluate implementation. In addition to working with Four Seasons to successfully implement Vision Tree and analyze program data, Duke also conducted a time and motion study, focus groups, and interviews that are all being used to inform Four Seasons on the progress of its program implementation and development of its payment model.

Leaders at all implementation sites reported satisfaction with their communication with Four Seasons staff and leaders, noting that collaboration with Four Seasons is a helpful factor in successful program implementation at each of the sites. Four Seasons holds formal

teleconferences with the implementing sites monthly and conducts teleconferences informally several times a month. During the meetings, Four Seasons reviews site-specific quality data with the implementing sites and discusses changes to program operations that may be necessary. Program staff at one site specifically noted that "ride alongs," during which Four Seasons administrators shadow clinical staff in the field, have improved understanding and thus communication during meetings between the operational and clinical teams.

For the second year in a row, program staff and leaders at all implementing sites commended the CPC training during the interviews. The training is a 40-hour immersion course for program staff and administrators that covers numerous aspects of the CPC program, including but not limited to palliative care, cultural competency, coding and billing best practices, and workplace leadership.

One program feature that has not yet been implemented is the patient and family education module. The Four Seasons team is working to design a one-stop tool that is intended to be easy for families to navigate.

3. Organizational and external context

The organizational and external context in which Four Seasons and its partners operate continued to profoundly influence the implementation of the CPC program in the "real world." In some cases, this context facilitated program implementation, and in others, it impeded implementation. For instance, Four Seasons and its partner sites all had prior experience with implementing palliative care programs. According to program leaders, these laid the foundation for implementing the CPC program. For example, Four Seasons has been a national leader in palliative care for years. The awardee ran some version of the CPC program for over 12 years prior to the cooperative agreement, according to interview respondents. Program staff and leaders believed that the HCIA R2 funding enabled Four Seasons to dedicate additional resources necessary to improve program operations and expand the service area. The new implementing sites also had existing palliative care programs.

> "[Four Seasons has] actually been doing this palliative care for a while, and certainly the same amount of money enhanced it sustainability-wise. I think [Four Seasons is] pretty committed to it because they think it's the right thing."
>
> *— Partner staff*

The impediments to program implementation, however, outnumber the facilitators, and they fall within the broad categories of funding, technology, and palliative care. For example, Four Seasons program leaders cited the delay in receiving HCIA R2 carryover funds to be the biggest challenge to implementation so far. Four Seasons realized after being awarded HCIA R2 funds that the Year 1 funds were $1 million more than what it planned to spend in the first year. Program leaders thought a request for carryover would be simple, but found it to be a time-consuming process. (The carryover funds had not yet been approved at the time of our interviews.) According to program leaders, waiting for carryover funds put financial strain on the program, forcing the awardee to delay some aspects of implementation, such as hiring additional staff at new implementing sites. "[The delay to approve our carryover funds] has plagued us throughout, and probably will continue to," a program leader said.

Program staff continue to be burdened by the double entry of data—that is, once in the organization's EMR system and then again in Vision Tree. Leaders at the new implementing sites commented that their program staff were especially burdened by the double entry of data because the CPC program is less established and has fewer resources. Leaders said that their sites needed to hire more nursing or office staff to help with the data entry and prevent overburdening current CPC staff. In the first program year, the EMR system also was not interoperable with the QDACT data system. In response to this challenge, at the start of the second program year, the program leaders identified a new EMR system that was specific to palliative care and could integrate participant data from the new Vision Tree system, thus avoiding the need to enter participant data twice. Four Seasons leaders plan to implement this EMR system in the third program year and are hopeful that the new EMR system will improve the efficiency of program operations. However, only the Four Seasons implementing site will benefit from this system; the other implementing sites will continue using their current EMR systems.

Misperceptions about palliative care have also challenged the program staff's ability to provide services. "The biggest thing is that patients and families put palliative and hospice in the same [bucket]," one interview respondent explained, regarding participants and their families' hesitancy to accept palliative care services. To overcome the misperceptions, program staff are encouraged to explain up front to participants the difference between palliative care and hospice care. Clinical staff also give participants examples of palliative care that are relevant to the participant—for example, a participant with congestive heart failure would be taught how to monitor fluid in the lungs to minimize discomfort and reduce trips to the hospital.

Finally, the workforce shortage in palliative care continues to challenge program implementation. Interview respondents commented on the difficulty of finding qualified palliative care providers—that is, providers who were willing to work in rural areas and who had the expertise and personal values to provide end-of-life care.

C. Development of the payment model

> "We need payment reform in order for CPC to be sustainable. We have proposed changes to the payment model, and Duke is leading the effort to figure out the costs of services. . . . With [accountable care organizations], we're seeing a huge interest in the CPC model. We think the appropriate incentives will change the dynamic."
>
> *— Program leader*

Several respondents commented that a FFS payment system does not provide the appropriate incentives for the provision of high quality palliative care services; they stressed the importance of replacing a FFS model with a payment system that aligns financial incentives effectively. For example, one of the implementing providers said, "I think in the future, as patient experience becomes more important and we get paid based on patient satisfaction more, I think that is going to change what providers do and how they think about palliative care." Another implementing provider added, "We need to fix reimbursement. This is an area that stresses us the most. How can we provide services when [palliative care] is a loss leader?"

As noted earlier, Duke is working with Four Seasons to conduct data collection, perform an internal evaluation, and develop a payment model for the CPC program. Duke is analyzing

several data sources including Medicare claims to develop a payment model for CPC services. For example, during Year 2, Duke conducted a time, motion, and cost study to capture the time, resources, and costs required to deliver program services. In addition, Four Seasons and Duke organized the CMMI Model Stress Test on CPC, a multistakeholder expert meeting, in the District of Columbia on April 15, 2016, to discuss the payment model and how CMMI might move beyond the cooperative agreement to a payment model for palliative care in the overall Medicare fee-for-service payment system.[4] Four Seasons' current plan for the payment model diverges from the original plan in its grant application, which indicated that the payment model would be implemented in the third year after two years of data collection and analysis. But program leaders said that lags in receiving claims data delayed the payment model implementation. Now, in the third program year, the awardee will create a simulation model of the payment model by using claims data to show how the money would have flowed. The awardee will compute the magnitude of a palliative care services bundled payment based on a comparison between the actual payments and the simulated payments. "But we need the right data so we know that what we're simulating is real," the Duke analyst said. Duke has requested the full data for North Carolina and South Carolina and a sample from six other states to help inform their analysis.

According to the payment experts at Duke, the initial thinking was to develop and propose an episode bundle. However, by the time of the April 2016 CMMI Model Stress Test on CPC meeting, they were inclined to take a different approach because of concerns that an organization such as Four Seasons could not handle the financial liability or risk for a fully bundled payment. Program leaders reported that during the conference sponsored by CMMI in June 2016 for all HCIA R2 awardees, CMMI staff encouraged Four Seasons and Duke not to give up on the bundled payment model and to perhaps consider a partially bundled payment for services (such as, prescription drugs, hospital care, and post-acute care) and a FFS payment for all remaining services (such as, outpatient physician visits and emergency department care). Although they have taken this suggestion under advisement, the Duke researchers believe that (1) a demonstration involving more than just Four Seasons and its implementing partners would be required to effectively test the payment model and (2) three years is too short a time period to calculate long-term impacts for a program involving end-of-life care.

[4] This was a meeting held at the Pew Charitable Trusts and organized by the Duke-Margolis Center for Health Policy and FSCL, and attended by national experts and federal policymakers interested in hospice, end of life, and palliative care. The meeting's goals were to develop a framework for Medicare Part B FFS reimbursement that would not cost CPC providers money and to determine whether population-based payment models can be developed that offer incentives for CPC.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our third summary of the beneficiary characteristics, common claims-based outcomes, and awardee-specific claims-based outcomes at baseline for beneficiaries participating in the CPC program. To be eligible for the program, a prospective enrollee must meet three criteria: (1) be age 65 or older; (2) have Medicare fee-for-service (FFS); and (3) have a life-limiting illness—which is defined by the Center to Advance Palliative Care as "any disease/disorder/condition that is known to be life-limiting (for example, dementia, cardiac disease, cancer) or that has a high chance of leading to death"—with a prognosis of three or fewer years. Based on the awardee's eligibility criteria, the treatment group being assessed in this report consists of Medicare FFS beneficiaries age 65 or older who had a life-limiting disease and enrolled in the program.

A. Baseline characteristics of the treatment group

As of May 31, 2016, the CPC program had 2,116 participants. The enrollment date is defined as the date that a beneficiary began to receive palliative care from Four Seasons, which may be earlier than the date that the beneficiary received the letter of implied consent regarding participation in the HCIA R2 program.

In presenting baseline characteristics for this report, we restricted the treatment group to beneficiaries (1) who enrolled in the CPC program from September 2014 through May 2016, (2) who were enrolled in Medicare FFS for at least 90 days during the baseline year (the 365 days immediately before their enrollment), (3) who were enrolled in Medicare FFS in the month that they enrolled in the CPC program, and (4) for whom we were able to link Medicare claims and enrollment data. After we excluded beneficiaries who did not meet these criteria, a total of 2,050 participants were included in the analysis of baseline characteristics for this report. The calendar period covered by the baseline quarters is based on the enrollment date for each beneficiary and therefore varies by beneficiary.

Based on the awardee's eligibility criteria, we expect that the treatment group will consist of Medicare FFS beneficiaries age 65 and older who had a life-limiting disease. A major challenge for the impact analysis is replicating the program's auxiliary eligibility criteria, which are outlined in a draft tool for providers to use when considering whether to refer a patient to the program. Some of the auxiliary eligibility criteria are relatively easy to apply via claims data, such as a high use of resources in the period before a beneficiary enrolled in the program (frequent hospitalizations and emergency department [ED] visits). Other criteria are much more challenging to apply via claims data, such as end-stage dementia, physical limitations, polypharmacy, a palliative performance scale, and the risk of falling. We have tried to determine which beneficiaries would have been eligible for the program had it existed in the pre-intervention period (and which beneficiaries are eligible for the comparison group) based on the auxiliary criteria because these criteria are what the awardee uses when selecting participants. To try to make this determination, we have used Medicare enrollment and claims data to characterize beneficiaries in the CPC program, emphasizing the measures that are included in the awardee's tool for referral to the program. Although our goal has been to identify study

eligibility criteria we could use to select a comparison group, the analyses we have conducted suggest that this may not be possible.

In terms of demographic characteristics, the Medicare FFS beneficiaries in the CPC program are much older and sicker than the general Medicare population in the Four Seasons service area, which is not surprising given that all participants have a life-limiting illness with a prognosis of three or fewer years. Close to half (43 percent) of the CPC participants are 85 years or older and a third (34 percent) are 75 to 84 years old (Table 2). In comparison, the average age of Medicare beneficiaries age 65 and older in the Asheville, North Carolina, Hospital Referral Region (HRR)—the HRR in which most CPC participants live—is 75 years old.[5] Most CPC participants (85 percent) were originally entitled to Medicare because of age; almost all of the other beneficiaries were originally entitled to Medicare because of a disability. The majority of participants are female (60 percent). Nearly all of the participants are white (95 percent), which reflects the racial composition of the Four Seasons service area. In 2014, only 2 percent of Medicare beneficiaries age 65 or older in the Asheville HRR were black. One-quarter of participants are Medicare-Medicaid dual eligibles. The average hierarchical condition categories (HCC) risk score of 3.46 for CPC participants is nearly four times as large as the average HCC risk score of 0.87 for Medicare FFS beneficiaries age 65 or older in the Asheville HRR—indicating substantially poorer health status and greater needs for care among the CPC participants.

Consistent with this poor health status, CPC participants had high rates of Medicare expenditures and service use in the year prior to enrollment, particularly in the quarter immediately before enrollment. In Table 3, we report baseline utilization and expenditure data for a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation. By providing a continuum of palliative care services that address participants' needs and by integrating care across settings, the awardee expects to reduce expenditures by reducing hospitalizations and ED visits compared with utilization that would have taken place absent the CPC program. We examined baseline expenditures by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $3,026, with average PBPM Medicare payments for inpatient ($1,137) and skilled nursing facility ($514) services being the largest drivers of total cost of care. Although Four Seasons does not require acute care utilization in the baseline period to be eligible for the program, providers consider the number of recent hospitalizations and ED visits when determining whether a patient is appropriate for the program. Therefore, it is not surprising that the total average PBPM Medicare payment in the last quarter before enrollment ($5,852) was more than twice as large as in any other quarter.

As with expenditures, CPC participants on average had high use of expensive Medicare services before enrollment in the program, particularly in the last quarter before enrollment. The annual rate of acute care hospitalizations was 1,390 per 1,000 CPC participants during the

[5] The data for the Asheville HRR presented here and in the following paragraphs are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation; HRR Table—Beneficiaries 65 and Older." Available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed April 2016.

baseline period—much higher than the rate of 215 per 1,000 Medicare beneficiaries age 65 or older in the Asheville HRR in 2014. The annual rate of acute care hospitalizations was 3,292 per 1,000 CPC participants during the last quarter before enrollment. This figure is higher than the rate calculated from the February 2016 finder file, which was an annual rate of 2,170 per 1,000 CPC participants during the last quarter before enrollment. This change likely reflects an increase in the share of CPC participants admitted to the program during or immediately after a hospitalization because the program expanded its referral sources to include additional hospitals. The likelihood of a 30-day unplanned readmission for CPC participants was 18 percent per discharge or 10 percent per beneficiary. The annual rate of ED visits not leading to a hospitalization was 1,183 per 1,000 CPC participants, while the rate of observation stays was 171 per 1,000 CPC participants. Thus, there may be an opportunity to reduce potentially avoidable admissions, ED visits, observation stays, and readmissions through comprehensive palliative care. At baseline, CPC participants were very high users of primary care visits (10,768 primary care visits in ambulatory settings per 1,000 CPC participants per year) and specialist visits (9,529 specialist visits in ambulatory settings per 1,000 CPC participants per year).

We also examined two other measures of utilization in the baseline period: (1) hospice and (2) intensive care unit or coronary care unit (ICU/CCU) services. Over the baseline period, the likelihood of hospice use for CPC participants was 5 percent, which was larger than the likelihood of 3 percent for all Medicare beneficiaries age 65 or older in the Asheville HRR in 2014 (Table 3). The likelihood of ICU/CCU use for CPC participants in the baseline period was 15 percent. That rate was driven by much higher ICU/CCU use in the last quarter before enrollment (likelihood of 9 percent) than in each of the prior three quarters (likelihood of 2 percent to 3 percent).

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 2,050)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	1	0.05
65 to 74	471	23
75 to 84	705	34
85 and older	873	43
Gender		
Female	1,225	60
Male	825	40
Race		
White	1,943	95
Black	81	4
American Indian, Alaska Native, Asian/Pacific Island American, or other	18	0.88
Hispanic	5	0.24
Original reason for Medicare eligibility		
Old age and survivor's insurance	1,736	85
Disability insurance benefits	305	15
End-stage renal disease (ESRD)[a]	9	0.44
Hospice[b]	63	3
Medicare/Medicaid dual status, percent dual[b]	522	25
HCC score[c]		Statistic
Mean		3.46
25th percentile		1.82
Median		3.16
75th percentile		4.65

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary began to receive palliative care from the awardee. All beneficiary characteristics are measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition categories

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	2,050	2,030	2,033	2,047	2,050
Average Medicare expenditures PBPM[a]					
Total	3,026 (66)	1,914 (90)	2,025 (89)	2,286 (92)	5,852 (143)
Acute inpatient	1,137 (34)	515 (39)	546 (44)	625 (47)	2,845 (98)
Inpatient other[b]	129 (15)	84 (35)	80 (20)	97 (24)	254 (32)
Outpatient[c]	450 (20)	378 (23)	395 (24)	457 (27)	567 (28)
Physician services	469 (11)	329 (14)	343 (15)	388 (14)	812 (20)
Home health	166 (6)	128 (9)	145 (9)	162 (10)	227 (11)
Skilled nursing facility	514 (20)	335 (30)	356 (32)	383 (31)	978 (44)
Hospice	107 (12)	90 (13)	106 (15)	122 (15)	108 (12)
Durable medical equipment	56 (6)	54 (7)	54 (6)	53 (6)	62 (8)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,390 (33)	689 (41)	705 (44)	852 (47)	3,292 (78)
Outpatient ED visits	1,183 (40)	865 (51)	922 (57)	1,110 (59)	1,826 (79)
Observation stays	171 (10)	156 (18)	128 (16)	151 (18)	248 (22)
Primary care visits in any setting	15,706 (301)	11,151 (350)	11,950 (368)	13,514 (378)	26,088 (569)
Primary care visits in ambulatory settings	10,768 (204)	8,703 (233)	9,234 (246)	10,304 (261)	14,773 (329)
Specialist visits in any setting	15,873 (349)	11,594 (378)	12,238 (392)	13,767 (437)	25,773 (691)
Specialist visits in ambulatory settings	9,529 (225)	8,475 (251)	8,770 (254)	9,579 (273)	11,252 (282)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	70 (1)	14 (1)	14 (1)	17 (1)	58 (1)
Percentage with an outpatient ED visit[e]	54 (1)	16 (1)	16 (1)	20 (1)	30 (1)
Percentage with an observation stay[f]	14 (1)	4 (< 0.5)	3 (< 0.5)	4 (< 0.5)	6 (1)
Percentage with a 30-day readmission among all discharges	18 (1)	13 (2)	16 (2)	19 (2)	21 (2)
Percentage of participants with a readmission among all participants	10 (1)	2 (< 0.5)	2 (< 0.5)	3 (< 0.5)	6 (1)
Percentage of participants who used hospice	5 (< 0.5)	2 (< 0.5)	0 (< 0.5)	1 (< 0.5)	1 (< 0.5)
Percentage of participants who used ICU/CCU	15 (1)	3 (< 0.5)	3 (< 0.5)	3 (< 0.5)	9 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; ICU/CCU = intensive care unit/coronary care unit; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Four Seasons

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	2,929
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	704
Likelihood of all-cause hospitalizations	314
MDE sample size requirement to detect 20% effect	
Total expenditures	176
Likelihood of all-cause hospitalizations	79
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	No, low rate of identification of treatment group with claims data with significant dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Serious concern; we may be not able to identify a strong comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Lack of strong comparison group
Survey data for treatment group that will be analyzed	Clinician and staff surveys
Implementation data that will be analyzed	None

We do not plan to conduct a rigorous impact analysis of the intervention implemented by FSCL. Enrollment in the program is based on a set of traits that cannot be identified in Medicare claims or other administrative data. Elements include housing status, substance abuse, lack of caregiver support, and most importantly, whether the referring provider would be surprised if the patient died in the next year. Although we do plan to compare outcomes for program enrollees with those of a matched comparison group, we will not characterize those differences as impact estimates.

V. NEXT STEPS

A. Implementation evaluation

As Four Seasons enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

It is not possible to replicate the awardee's enrollment criteria by using Medicare data. In our view, therefore, accurate estimates of Four Seasons' impact on outcomes cannot be constructed by using administrative data. We plan instead to draw a propensity score matched sample from a county with a low penetration rate for Four Seasons. We will include in the treatment group only those who die within two years of enrollment, defining the length of time until death from the most recent inpatient discharge. The matched comparison group will be similarly defined.

Difference-in-differences estimates resulting from this procedure cannot be construed as impact estimates. Rather, they capture differences in outcomes relative to beneficiaries with similar HCC scores, prior use, and time to death. Thus, they provide a point of reference for assessing whether outcomes for CPC patients are markedly different from those for comparison beneficiaries with similar observed characteristics.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, care coordinators, health coaches, social workers, health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, dentists, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

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APPENDIX B.16.

GEORGE WASHINGTON UNIVERSITY

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MATHEMATICA Policy Research

REPORT

APPENDIX B.16

HCIA Round Two Evaluation: George Washington University

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of George Washington University's Prevention at Home (PAH) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on George Washington University's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare and Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress did George Washington University make in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have George Washington University and its implementation partners addressed the issues identified during the first program year? What factors influenced the ability of the awardee and its implementation partners to address these issues?
4. To what extent do we expect to be able to conduct a rigorous impact analysis of George Washington University's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the PAH program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

George Washington University used funding from HCIA R2 to develop and implement the PAH, a program to optimize the HIV prevention-to-care continuum by delivering home testing kits to participants and offering them virtual counseling on sexual health behaviors through a web-based portal (see Table 1 for an overview of the program characteristics). The awardee's objectives for the PAH program—which was launched on April 28, 2015—were to increase the number of high-risk individuals in the District of Columbia who have been tested for HIV and sexually transmitted infections (STIs), to assist people living with HIV in getting care, to assist PAH participants in achieving an undetectable viral load, and to lower the health care costs associated with diagnosis and treatment of HIV and STIs.

The awardee partnered with eight hospitals, community-based organizations, and federally qualified health centers in the District of Columbia metropolitan area to provide HIV testing and care management to participants. Each clinical implementing site had at least two care partners, who recruited eligible residents into the PAH. Care partners were paraprofessional, advanced practice community health workers, who worked with their supervisors and nurse managers to enroll participants and manage their care.

Care partners recruited and enrolled eligible residents at community and clinical sites in the metro area. The program targeted adults age 18 or older who were eligible for Medicaid, Medicare, or Alliance.[2] Targeted participants either had an HIV diagnosis or were high-risk individuals whose HIV and STI status was unknown. Participants must have had a cell phone and email address. The target enrollment for the end of the three-year cooperative agreement was 16,000 participants—including, 12,000 participants who were at risk for HIV and STIs and 4,000 participants who were previously diagnosed with HIV.

The PAH was built around a customized, web-based care management system that was used both to enroll participants and to provide services and supports, such as a health needs assessment, health education, home-based HIV and STI testing, interactive computer counseling, and referrals by care partners to other needed services. Due to a series of delays, the web-based system was not available to the public for enrollment (staff gained access to limited features in April 2016). In addition, the care management services component had not been activated as of August 2016.

George Washington University had hoped to develop a payment model that covered HIV point-of-care testing and community health worker services.

George Washington University expected the PAH program to (1) improve the coordination of care for participants who were HIV-positive, at risk of becoming HIV-positive, or at risk of contracting other STIs; (2) link participants to health care services appropriate for individuals with HIV or STIs, or who were at risk for developing these infections; (3) improve the detection and reduce the incidence of HIV and other STIs; and (4) reduce HIV-related expenditures and utilization. Core program outcomes included (1) care management (that is, development and

[2] The DC Healthcare Alliance Program provides medical assistance to District of Columbia residents who are not eligible for Medicaid. More information can be found at http://dhcf.dc.gov/service/health-care-alliance.

implementation of health action plans, linkage to and retention in care, adherence to treatment, and lower hospital admissions and emergency department [ED] visits); (2) participant engagement in care, including self-testing at home and through point-of-care testing; (3) participant satisfaction; and (4) an increase in the HIV and STI detection rate.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by George Washington University during the first year of its cooperative agreement.

- Care partners reported that, in general, enrollees responded favorably to the program.
- Care partners identified and enrolled participants at the Department of Motor Vehicles and at the Department of Income Maintenance, demonstrating ingenuity in the identification and recruitment of program participants.
- PAH leaders successfully coordinated the billing process for the program's at-home STI testing component.

We also identified several initial challenges in implementing the program and George Washington University's strategies for addressing them.

- Because of technological delays, the PAH program did not launched its website, a major component of the innovation. Instead, care partners used paper-and-pencil forms for consent, registration, and progress notes, complemented by a Survey Monkey version of the risk assessment questionnaire.
- PAH leaders and implementing site staff faced communication challenges related to identifying and recruiting potential participants. George Washington University staff reported that they addressed the issue by (1) facilitating joint planning meetings with implementing site staff to ensure that they focused their outreach efforts on individuals most likely to meet PAH criteria, (2) hosting a group discussion about the enrollment criteria with the clinical and community implementing sites serving the target population, and (3) encouraging the implementing sites to hold recruitment events in various community venues.

Finally, we identified several early lessons learned by George Washington University in implementing its program.

- Additional time for planning and program start-up would have been beneficial, particularly for the testing and launch of the website. This additional time would have allowed PAH leaders to address early start-up challenges. Furthermore, additional thought and conceptualization of the program design, as well as the timelines and resources needed to succeed at this design, would have been helpful.
- Inconsistent availability of Wi-Fi connections in the field may have impeded mobile data collection, necessitating an alternative data collection methodology.

- Ensuring that the vision for participant identification and recruitment was clear before establishing partnerships would have minimized confusion among partners and possibly facilitated stronger partner involvement and recruitment efforts.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, George Washington University made progress in the following areas:

- Enrollment at the end of the second year of the cooperative agreement was at 26 percent, up from 4 percent at the end of the first year. This fell short of the awardee's three-year enrollment goal of 16,121, despite the hiring of a director of community implementation to review sites' recruiting processes and provide advice on ways to increase recruitment and enrollment.
- Five months after the original website launch date of November 2015,[3] the awardee launched the web portal on the PAH website. However, its use was limited to certain functions (for example, the care management and follow-up components were not yet activated because of health information technology [IT] software issues).

Over the past year, George Washington University also made several changes to its program.

- To bolster enrollment, George Washington University (1) piloted a peer recruitment strategy that was intended to incentivize current PAH participants to help identify and recruit eligible community members, (2) hired additional care partners to assist with recruitment, and (3) partnered with two additional implementing sites (United Medical Center and Howard University Hospital).
- The awardee changed its recruitment efforts to focus on HIV-positive individuals, not those at risk for HIV or those at risk for STIs.

Below we note the key challenges that George Washington University worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- The awardee's major challenge continued to be launching the care management system within the web portal because of issues with the health IT software system.

George Washington University voluntarily terminated its cooperative agreement with CMMI and withdrew from the HCIA R2 initiative effective September 1, 2016. However, this report covers the second program year (September 1, 2015, to August 31, 2016), during which time George Washington University participated in the program for 10 months. Therefore, the awardee is included in the main body of the report and in Appendix B.

[3] The awardee did not plan to launch the website until later in the cooperative agreement. However, that initial launch date was pushed back five months due to technical issues.

Table 1. George Washington University: PAH characteristics at a glance

Program characteristic	Description
Purpose	George Washington University (GWU) used a web-based care management system to provide PAH participants with a health needs assessment; education; at-home testing for HIV and STIs; interactive computer counseling; and, with help from care partners, referrals to care.
Components	• Health IT. A website with educational and counseling features and a web portal with data collection features • Patient engagement. Point-of-care testing and at-home testing kits for HIV and STIs • Care management. Assessment, development of health action plans, ongoing care management, and coordination of services with health care providers
Target population	DC residents age 18 and older who were eligible for Medicaid, Medicare, or the DC Healthcare Alliance Program and who were diagnosed as HIV-positive, at risk of contracting HIV, or at risk for other STIs
Theory of change/theory of action	GWU hypothesized that PAH participants who completed testing and virtual or face-to-face counseling and who received health action plans from care partners would have realized a reduction in health care costs associated with continuation of care, a reduction in expenditures associated with ED visits and hospital admissions, and improved health outcomes.
Payment model	Payment innovations were expected to integrate billing of point-of-care and at-home HIV and STI testing at the provider level.
Award amount	$23,808,617
Launch date[a]	April 28, 2015
Setting	The PAH program was implemented in three settings: (1) hospitals, (2) federally qualified health centers and look-alike clinics, and (3) community-based organizations.
Market area	Urban
Market location	DC
Core outcomes	• Care management (that is, development and implementation of health action plans, linkage to and retention in care, adherence to treatment, and lower hospital admissions and ED visits) • Participant engagement in care (that is, self-testing at home and at the point of care) • Participant satisfaction • Increased detection rate

[a]After the initial planning period, the awardee's program began to operate as of this date.

ED = emergency department; IT = information technology; STI = sexually transmitted infection

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by George Washington University in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff in July 2016. For the analyses of George Washington University's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that covered the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- The co-principal investigator
- The executive director
- The health IT analyst
- Three care partner supervisors
- Two care partners

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

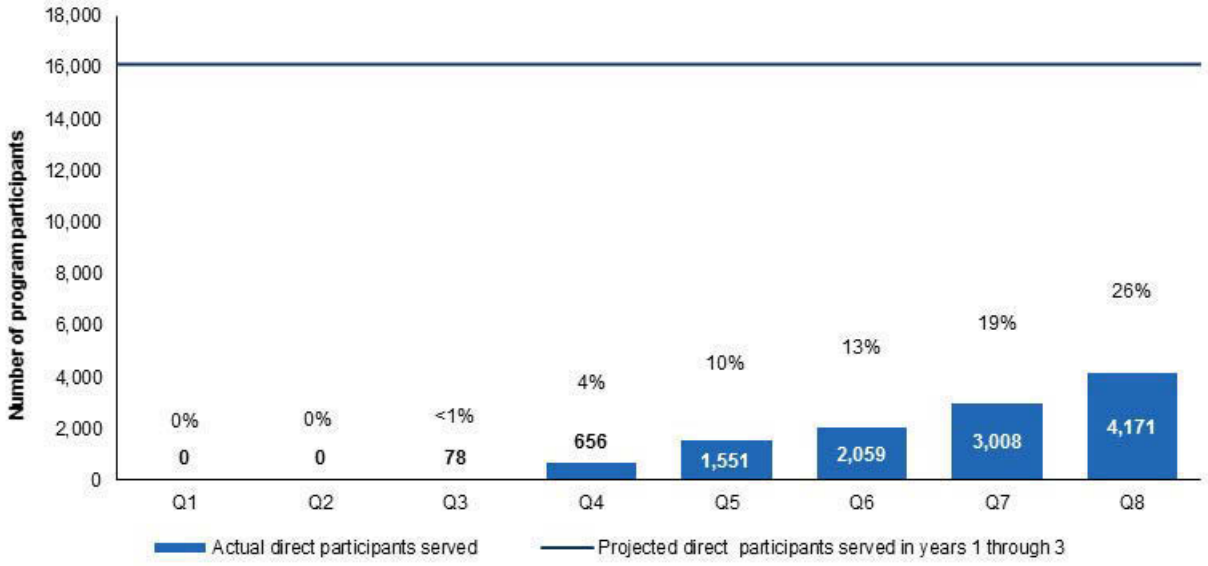
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on George Washington University's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, George Washington University reported to the implementation and monitoring contractor that it directly served 4,171 participants from March 2015 (the launch of its program) through August 2016, which represents about 26 percent of its 16,121 projected direct participants (Figure 1).

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expected to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. The PAH did not have indirect program participants.

A major barrier to George Washington University's progress in meeting its three-year enrollment goal was the delay in the release of the PAH website, mytestmyway.org, which was supposed to be the cornerstone of the awardee's enrollment strategy. The website did not launch until late April 2016, and its use was limited to care partners (that is, potential participants may not access the website themselves). Furthermore, the website continued to experience technical issues such as freezing and difficulty meeting security requirements. In addition, the literacy level required to enroll in PAH through the website was higher than the average participant's literacy level. Those with high literacy used the website (once they were given access from a care partner), and those with low literacy relied on the help of a care partner. Care partners (who could access the PAH website) noted that it has streamlined the enrollment and assessment process by eliminating paper assessments.

> "There were challenges in improving the usability of the website for low-literacy populations. We know what we need to do, but we were waiting for carry-over funds to do it. And then we decided to switch to HealthEC, so we haven't . . . because it's going to be improved through this transition to HealthEC."
>
> — *GWU leader*

George Washington University recruited two additional clinical implementing sites: Howard University Medical Center and United Medical Center. Both sites signed a memorandum of understanding and actively recruited and enrolled participants. Although these two new sites had a learning curve—corrections had to be made to ensure that the sites were "reaching out correctly"—both became more proficient, and their enrollment numbers increased. In addition, one of George Washington University's existing payers, AmeriHealth, a District of Columbia managed care organization, hired new care partners to support the PAH through a call center. The call center staff attempted to recruit participants from a list of HIV-positive AmeriHealth members, who are ranked from highest to lowest utilizers.

> "United Medical Center and Howard folks . . . are very active [in] working very collaboratively with the other community partners and they are starting to [do] joint [community] testing events."
>
> — *GWU leader*

Another facilitator was a change in the scope of the care partners' recruiting efforts. They began to focus primarily on recruiting HIV-positive and at-risk individuals who were already enrolled in care at clinical implementing sites, as opposed to identifying undiagnosed individuals or those at risk for STIs in the community. The awardee's rationale for the change was that (1) the three-month follow-up with undiagnosed individuals was too labor-intensive, and (2) care partners were not able to offer STI testing through the website. George Washington University used peer recruiters (described below) to help conduct high-yield recruitment efforts in Section 8 housing developments and at local community events.

George Washington University worked toward increasing enrollment through peer recruiters. Peer recruiters were enrollees who were HIV negative and who were trained to recruit other community members who were eligible for the PAH. The peer recruiters received $20 per individual recruited. However, peer recruitment yielded lower-than-expected enrollment numbers. In addition, despite their training, the peer recruiters found it challenging to navigate the PAH website. George Washington University worked with peer recruiters to help bring potential participants to recruitment events, where they were directed to care partners for enrollment.

George Washington University put more pressure on sites to increase enrollment and to authorize overtime for care partners. However, enrolling individuals in the PAH continued to be time-consuming. During interviews, care partners reported that enrolling four people in one day was considered "a good day," but the weekly target for each clinical implementing site was 40 enrollees. Enrolling participants accounted for a lot of a care partner's time, which took away from recruiting other eligible community members.

B. Implementation of the service delivery model

George Washington University made limited yet important progress in implementing its service delivery model. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.

- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

George Washington University changed its approach regarding the health assessment (a risk questionnaire completed prior to obtaining test results). Initially, full assessments were a barrier because they took about 40 minutes for participants to complete. This was longer than other competing testing services in the area because the assessment had additional educational and risk components. Other HIV testing services require about 20 minutes. During Year 2, care partners began to conduct a shortened version of the assessment, first including the administration of the rapid oral HIV test. If the test was reactive, they proceeded to conduct the remaining assessment questions prior to enrolling the participants into the program.

> "The three-month follow-ups take a lot of time. . . . It takes a lot of manpower, and it's challenging enough to try to follow up on individuals who you find reactive. That's a challenge."
>
> *— Care partner manager*

2. Implementation processes

During the second program year, George Washington University focused on increasing the PAH website usability. One main barrier in the implementation process was that the awardee continued to experience usability issues with the then current version of the web portal. Internet connectivity remained an intermittent disruption depending upon where the care partners are located.

At the time of our interviews, George Washington University was transitioning its health IT vendor from N-tonic to HealthEC. The awardee also reported that HealthEC has a care management tool that it can integrate into the PAH website and portal. Once implemented, the tool can be used not only for HIV but also for managing chronic diseases that participants may have, such as diabetes or hypertension. This would be a facilitator for keeping these individuals in care.

The awardee maintained that the care partners were ambassadors in the community, acting as liaisons between the community and the PAH website. Their role became increasingly important because the website was not publicly accessible; nor did it accommodate users with low-literacy levels. To better equip staff, George Washington University conducted care partner training in motivational interviewing to help improve PAH participants' care-seeking behaviors and medication adherence (among those who were HIV-positive). The awardee also created and disseminated training materials, including a cheat sheet on how to use the web portal when enrolling participants.

3. Organizational and external context

George Washington University experienced unique local challenges to offering an HIV program in the District of Columbia, which were barriers to implementation. Numerous other organizations in the District of Columbia offer HIV testing programs, so they had no incentive to partner with George Washington University. In Year 2, one of George Washington University's partners, Whitman Walker (a community health center serving the LGBT and HIV community), decided not to participate as an implementing site but instead offered support by distributing marketing materials and making patients aware of the PAH program.

CMMI allowed George Washington to spend unused funds from the first year of the cooperative agreement to change health IT vendors. The new vendor, HealthEC, had a platform that offered more privacy features than the former vendor, N-tonic. However, the awardee reported that the receipt of these funds took longer than anticipated, which contributed to further delays in the launch of the PAH website.

C. Development of the payment model

George Washington University's efforts to develop a payment model that would cover HIV point-of-care testing and community health worker services were stymied by payers' reluctance to pay for at-home testing kits and to reimburse care partners for their care management services. In a sign of progress, the awardee noted that the DC Medicaid program was pursuing a Medicaid State Plan Amendment to finance the work of community health workers (although, it was not clear if this would include care partner services).

George Washington University signed a data use agreement with an actuarial company, Oliver Wyman, to assess the financial aspects and impact of the PAH. The new health IT vendor, HealthEC, offered more capabilities than the previous vendor, but George Washington University reported that there were nominal per beneficiary per month fees for using HealthEC, which were a barrier to implementation.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data. We will not conduct an impact evaluation for George Washington University because the awardee voluntarily terminated its cooperative agreement with CMMI.

Table 2. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: George Washington University

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,710
Likelihood of all-cause hospitalizations	1,885
MDE sample size requirement to detect 20% effect	
Total expenditures	428
Likelihood of all-cause hospitalizations	471
Participation/selection bias of concern	Yes, provider clinical judgment/nonclaims data used to identify treatment group; patient self-selection high
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, did not have data to attempt to identify treatment group in claims before award ended
Likelihood of solid comparison group	Unclear; prior to the termination of the award, Medicaid data was not available to assess the potential comparison group
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	Not applicable
Primary reason for no rigorous evaluation	Program terminated
Survey data for treatment group that will be analyzed	Staff survey
Implementation data that will be analyzed	None

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V. NEXT STEPS

A. Implementation evaluation

Because of the awardee's voluntary withdrawal from the program, we are not planning to collect any additional data for the implementation evaluation.

B. Impact evaluation

We are not planning to conduct an impact analysis for George Washington University because of the awardee's voluntary withdrawal from the program.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we administered a survey of non-clinician staff affiliated with the program during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include care partners, health IT staff, and administrative staff.

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APPENDIX B.17.

JOHNS HOPKINS UNIVERSITY

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REPORT

APPENDIX B.17

HCIA Round Two Evaluation: Johns Hopkins University

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second a series of four, updates the narrative in our first annual report in which we described our early understanding of the Maximizing Independence at Home (MIND) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Johns Hopkins University progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare/Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Johns Hopkins University made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Johns Hopkins University addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Johns Hopkins University's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Maximizing Independence at Home (MIND) program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Johns Hopkins University received an HCIA Round 2 award to support the Maximizing Independence at Home (MIND) program (see Table 1 for more details). The awardee is partnering with two home health agencies—Johns Hopkins Home Care Group and Jewish Community Services—to coordinate in-home care to older adults living in and around Baltimore who have been diagnosed with Alzheimer's disease or other dementia-related neurodegenerative diseases. When it launched the MIND program on March 2, 2015, John Hopkins University originally targeted only individuals enrolled in Medicare and Medicaid (dual eligibles), but the awardee recently decided to include Medicare beneficiaries as well.

The MIND program's primary goal is to delay or prevent adults with Alzheimer's disease or other forms of dementia from moving out of their homes and into supported living facilities or nursing homes. Additional goals include (1) fewer emergency department (ED) visits and hospital admissions as a result of a safer home environment and improved well-being, (2) a reduction in the percentage of unmet needs in among people with Alzheimer's disease and other forms of dementia, and their caregivers, and (3) the development of a sustainable payment model that would allow the MIND program to be scaled to the larger community.

Johns Hopkins University disseminates information about the MIND program through partnerships with Maryland Medicaid and organizations that support older adults. The enrollment process begins when caregivers of potentially eligible individuals call the MIND referral line for an initial eligibility phone screen. Potential participants move on to the next phase of the enrollment process if dementia has been shown to be present (either through an existing diagnosis or a short assessment conducted by MIND clinical staff) and if the individuals are Medicare beneficiaries or dually eligible, live in the MIND program's catchment area, and have a study partner (a caregiver or other individual who can support them in the community). After the phone screen, a psychiatric nurse and a memory care coordinator (MCC) visit the potential participant's home to conduct an extensive assessment that confirms the beneficiary's eligibility for the program.

During this initial visit, the MCC and the nurse also identify the physical health, mental health, and social needs of the individual and the caregiver. Once individuals are enrolled in MIND, an interdisciplinary team, managed by a geriatric psychiatrist and composed of other clinicians, works with the MCC to address these needs through regular interactions and home visits. For instance, the MCC could (1) connect participants to meaningful activities, (2) educate caregivers in how to mitigate the participants' risky behaviors, (3) refer participants to services that improve the safety of the home environment, and (4) work closely with the clinical team to coordinate care.

Johns Hopkins University evaluates the participants' physical and mental health status, as well as their social service needs at 9 and at 18 months. The awardee initially intended to enroll 600 individuals by August 2016, exposing participants to the full 18 months of the intervention before the end of the cooperative agreement. However, enrollment challenges prompted the awardee lower its enrollment goal to 300 individuals.

After HCIA Round 2 funding ends, John Hopkins University intends to cover the cost of the intervention through two capitated payments, one for MCCs and another for the clinical team. The awardee also plans to establish a shared savings model in which the payer offers home health agencies the opportunity to share the savings that accrue as a result of the program. Program leaders are calculating the cost savings generated by MIND in order to encourage the Maryland Medicaid program to adopt MIND.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Johns Hopkins University during the first year of its cooperative agreement.

- As of October 19, 2015, the awardee had enrolled 32 dual eligibles with dementia, and 11 other individuals were close to being enrolled.
- Four MCCs, operating out of the Johns Hopkins Home Care Group and Jewish Community Services, were working closely with these participants and their families to help them remain safely in their homes.
- MCCs were connecting individuals to meaningful activities, providing tips and referrals to local organizations to improve the safety of the participants' homes, and collaborating with the clinical team to address medical issues.

We also identified several initial challenges in implementing the program and Johns Hopkins University's strategies for addressing them.

- The awardee struggled with enrollment. Dual eligibles are often difficult to reach and to connect with services because they may live in isolated conditions with caregivers who are unable to enroll them or participate actively in the program.
- Johns Hopkins University addressed the enrollment issue by changing its enrollment criteria and expanding its catchment area. Individuals are not required to have a pre-existing diagnosis of dementia as long as they show signs of dementia through an initial phone screen and an in-home assessment. In addition, the awardee started targeting individuals within a 40-mile radius of Baltimore.
- The awardee promoted the program more aggressively, getting the word out through churches, medical providers, and service agencies that serve the target population. In addition, the Maryland Medicaid program, in partnership with the awardee, has sent numerous letters to dual eligibles.

Finally, we identified several early lessons learned by Johns Hopkins University in implementing its program.

- In-home visits can expose an individual's needs better than a typical office visit. By seeing an individual's living conditions firsthand, MCCs could better assess participants' needs and work more effectively to address them.
- Recruiting dual eligibles was a challenge. MIND staff found that other programs and managed care organizations (MCOs) also struggle to reach these individuals.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Johns Hopkins University made progress in the following areas:

- The awardee reported that it enrolled 322 participants from March 2015 (when it launched its program) through August 2016, which represents about 107% percent of its 300 three-year projected number of participants (adjusted downward from 600). Enrollment increased in the second program year because of the expanded eligibility criteria and extensive outreach.
- After the increase in program enrollment, Johns Hopkins University hired additional nurses and MCCs to assess participants' care needs and connect them to supports and services. During the 18-month intervention, MCCs advises participants on home modifications and coordinates their medical care by, for example, identifying providers that accept Medicaid and then scheduling appointments with them.
- To develop its payment model, Johns Hopkins University is calculating the costs of the MCCs and the clinical staff's time to establish capitated payment amounts. In addition, the partnership with Maryland Medicaid's claims processor has facilitated access to health care cost and utilization data, which the awardee will use to develop the shared savings component of the payment model.

Over the past year, Johns Hopkins University also made several changes to its program:

- The awardee streamlined the enrollment process. It reduced the number of home visits before implementing the care plan from three to two, thus shortening the time before participants receive the intervention. In addition, MCCs started participating in both of these visits to establish relationships with participants sooner.
- Johns Hopkins University has focused on reducing the number of hospitalizations given high utilization among participants. Specifically, Johns Hopkins University began analyzing hospitalization data to develop more clinically focused interventions, such as direct communication between nurses and caregivers and tele-health consultations.

Below we note the key challenges that Johns Hopkins has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- The streamlined enrollment process shifted enrollment functions away from the program evaluators to the MCCs, thus increasing their workload. As a result, the awardee contracted with additional MCCs to distribute the caseload more equitably. This change also helped to ensure that the MCCs have enough time for the monthly follow-up home visits with existing participants.
- Some participants are not actively engaged in MIND. As enrollment winds down and the MCCs have more time, they plan to conduct more home visits with these individuals to identify and address the barriers to participation.

As Johns Hopkins University enters the final year of its cooperative agreement, it is anticipating the following challenges:

- For the shared savings component of its proposed payment model, Johns Hopkins University is calculating cost savings separately for three groups of MIND participants: Medicare-only beneficiaries, dual eligibles, and partial dual eligibles (for whom Medicaid covers the health insurance premium). Given that Medicare does not cover the cost of long-term care, the awardee expects to see lower savings for this group.
- Partial dual eligibles pose the greatest challenge because Medicaid does not have complete utilization and expenditure data for them.
- There may not be enough participants in each group to yield statistically significant results.

Table 1. Johns Hopkins University: MIND characteristics at a glance

Program characteristic	Description
Purpose	The Johns Hopkins University School of Medicine and two home health providers—Johns Hopkins Home Care Group and Jewish Community Services—are using the HCIA R2 award to implement the MIND program, which provides in-home care to older adults living in and around Baltimore, MD, who have been diagnosed with Alzheimer's disease or other dementia-related neurodegenerative diseases.
Components	• Care management • Patient and family engagement • Health information technology
Target population	Older Medicaid and Medicare beneficiaries in MD who have Alzheimer's disease or a related form of neurodegenerative dementia and a study partner, typically a caregiver
Theory of change/theory of action	The MIND program is carried out by an interdisciplinary team of clinicians and MCCs who are managed by a geriatric psychiatrist and who support individuals and families in their homes. The program's primary goal is to delay or prevent adults with Alzheimer's disease or dementia from moving out of their homes and into supported living facilities or nursing homes.
Payment model	Separate capitated payments for MCC and clinical staff; shared savings between Medicaid and home health care agencies
Award amount	$6,387,736
Launch date[a]	March 2, 2015
Setting	Participants' homes
Market area	Urban and suburban
Market location	Baltimore, MD, and surrounding area
Core outcomes	Cost savings and improved patient quality of life resulting from participants remaining in their homes longer and in a safer home environment

[a]After the initial planning period, the awardee's program began to operate as of this date.

MCC = memory care coordinators

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Johns Hopkins University in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 20 to June 30, 2016. For the analyses of Johns Hopkins University's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Awardee administrators, including programmatic and clinical leaders
- MCCs
- An enrollment specialist
- Payment model specialists
- Program evaluators

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each section includes an update on Johns Hopkins University's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

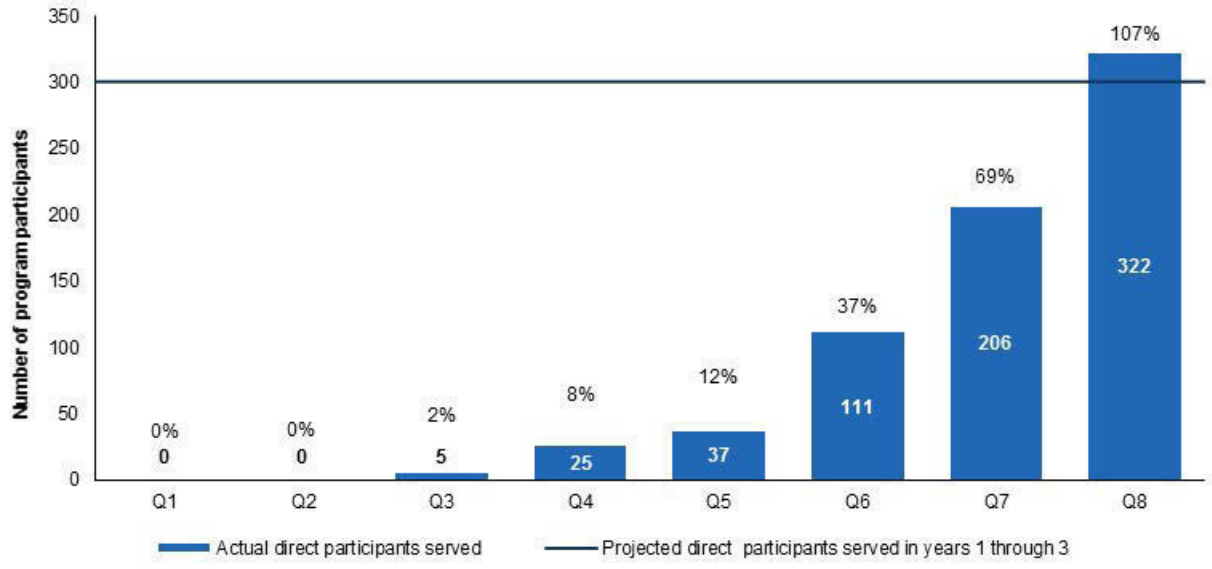
[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

John's Hopkins University reported to the implementation and monitoring contractor that it directly served 322 participants from March 2015 (the launch of its program) through August 2016, which represents about 107.3% percent of its 300 projected direct participants (adjusted downward from 600) (Figure 1). Since participants must be enrolled in the MIND program for a minimum of nine months, the awardee concluded its enrollment efforts in August 2016.

Johns Hopkins University initially planned to enroll 600 individuals by the end of its cooperative agreement but adjusted the target downward to about 300 due to slow progress. Challenges with enrollment early in the program ultimately prevented Johns Hopkins University from reaching its initial enrollment target of 600 participants. These challenges included difficulty in recruiting participants who met all the initial program eligibility criteria, low dementia detection rates among health care providers, and an extreme wariness of research and the consent process in the community. However, in the second program year, the awardee made considerable progress in participant enrollment and ultimately surpassed its adjusted enrollment target of 300 participants.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. JHU does not have indirect participants.

Johns Hopkins University's progress toward its adjusted three-year enrollment goal was facilitated by an expansion of the MIND eligibility criteria and enhanced outreach. First, the awardee opened the MIND program to individuals enrolled solely in Medicare, in addition to dual-eligibles. This change boosted enrollment because it vastly increased the number of eligible participants. In addition, MIND staff hypothesized that Medicare-only beneficiaries would face fewer social challenges, stigma, and isolation, all of which hampered the engagement of dual eligibles in the MIND program. The MCCs reported that although Medicare-only participants tend to have the same level of need as their dual counterparts, they are often easier to reach. In addition, Johns Hopkins University's decision in Year 1 to enroll individuals diagnosed with Alzheimer's or dementia by MIND clinical staff—as opposed to those with a pre-existing diagnosis—steadily increased enrollment.

> "The difference I noticed was a lot of the Medicare [only] people are definitely calling you back more and are easier to reach."
>
> *— MCC*

Johns Hopkins University also increased enrollment by forging relationships with community organizations and health care providers. For example, the MIND outreach coordinator partnered with churches, Area Agencies on Aging, the American Association of Retired Persons (AARP) Maryland, the Alzheimer's Association of Maryland, and Meals on Wheels to communicate with their constituents about MIND through newsletters and forums. Johns Hopkins University has been strengthening these partnerships by promoting the organizations' activities and events to MIND participants through its own monthly newsletters. In addition, the awardee established a partnership with a Medicaid MCO that targets dual eligibles. Once a contract with Johns Hopkins University is finalized, the MCO will send letters to its enrollees, informing them of the initiative and asking them to contact the MIND staff to learn more and, if they are eligible, to enroll. With permission from participants, MIND staff also hope to inform the individuals' primary care physicians (PCPs) about the program and to coordinate the participants' medical services.

Johns Hopkins University also began to more actively recruit individuals in Montgomery and Prince George's counties, which were added to MIND's catchment area during the first program year. For instance, through its partnership with the Maryland Medicaid program, Johns Hopkins University sent dual eligibles in these counties three mailings. CMS had recommended this strategy because a single notification may be quickly lost or forgotten. The results of expanding the catchment area were limited, however, because many referrals spoke Spanish only and were not eligible for the program; Johns Hopkins University did not have the resources to hire interpreters and conduct the institutional review board (IRB) approval process for translated materials.

B. Implementation of the service delivery model

As more people enrolled in MIND, Johns Hopkins University hired additional nurses and MCCs. On average, MCCs typically come into contact with participants 25 times during the 18-month intervention. Through these interactions, often home visits, MCCs assess the participants' needs for care and connect them to supports and services, such as a specialist that accepts Medicaid or a home modification contractor that could make their homes safer and more accessible. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Program staff indicated that the home-based care coordination model used in the MIND program allows MCCs to effectively identify and address participants' needs and the needs of their caregivers. For instance, MCCs connect individuals to community resources. One MCC described a recent interaction with a participant who likes to "take the bus around the city for fun" but often gets lost. She worked with him to obtain a Medic Alert ID bracelet. In addition, she helped him gain access to Meals on Wheels five days a week and to a paid caregiver two days a week.

MCCs also provide clinical support, which is perhaps one of the greatest strengths of the MIND program because it enhances care coordination. One MCC described working with her clinical team and a participant who had received a liver and kidney transplant to ensure a smooth transition from the hospital to the participants' home. The MCC also planned to get in touch with the participant's home care nurse so that they could coordinate their efforts.

MCCs emphasized the importance of providing caregiver support. Because caring for individuals with dementia or Alzheimer's is uncharted territory for many caregivers, MCCs educate them on typical behaviors and communication and risk reduction strategies. Equally important is the emotional support that MCCs provide to caregivers – who may be struggling with burn out or their own health issues.

> "A lot of caregivers are just emotionally very drained and need somebody to talk to and to provide some appreciation for what they're doing. They are also looking for some guidance about what's the normal behavior and what needs to be addressed by a medical person. Just some communication techniques. I deal with that a lot."
>
> *— MCC*

Conducted by MCCs and nurses at nine months, the midpoint assessment of participants' mental and functional status, and their continuing needs was developed primarily to inform the evaluation, but it has brought other benefits. Through assessment findings, program staff can more readily identify the participants' unmet needs, improve the management of their care, and provide additional supports.

2. Implementation processes

During the second program year, Johns Hopkins University focused on streamlining the enrollment process, continuing to train new and existing staff, and engaging in process improvement. Johns Hopkins University streamlined the enrollment process to expedite participants' access to services and help MCCs establish relationships with participants sooner. In one visit instead of two, program staff now collect data that support the evaluation and inform the care plan. In addition, under the new process, MCCs have replaced program evaluators in collecting these data, and they reported that they appreciate the streamlined enrollment because they connect with participants sooner. The awardee is hoping that the new process will reduce the likelihood that participants will drop out of the program. However, the workload of the MCCs and nurses has grown because they now collect all the data. Johns Hopkins University has hired additional MCCs to reduce their workload and to help ensure that they have enough time for these enrollment activities while supporting the existing participants.

> "When the memory care coordinator does the baseline visit, she establishes a connection with the family sooner. Before, we were having trouble with following up after the baseline visit. The care coordinator would keep trying to reach out to the family, and sometimes they weren't able to get in contact. So now, at the initial home visit, the memory care coordinator can schedule the follow-up visit right then and there, so they're able to maintain that relationship and make it easier for them to keep the appointment."
>
> *— Program evaluator*

> "I think going out with experienced MCCs was really helpful. It was a lot of information to pass us at once and to see it all unfolding first hand. Seeing how they handled different situations really helped prepare us for when we went out on our own."
>
> *— MCC*

Shadowing existing MCCs was an important aspect of the MCCs' training. Johns Hopkins University has been continually hiring MCCs as more participants enroll in MIND. New MCCs attend an extensive two-month training program to get up to speed in data collection protocols, community resources, and strategies for communicating with and for supporting participants and their caregivers. Because each interaction with a participant is unique, new MCCs value the hands-on experience gained through shadowing and then being accompanied by existing MCCs.

The MCCs' time has been strained by the larger catchment area. Because MCCs typically live in the Baltimore area, they must spend more time traveling for home visits that occur in outlying counties. This increased travel time makes "no shows" –when a participant and caregiver are not at home for the visit–even more detrimental to staff productivity.

Johns Hopkins University developed new interventions to reduce high rates of ED use and hospitalizations among participants. To better understand the common causes of hospitalizations and to provide post-discharge support, MIND program leaders created an adverse event reporting form, which MCCs are required to fill out in detail every time a MIND participant is hospitalized. Program leaders also started to work with the John Hopkins University's ED so that they could receive both timely notifications of

> "Identifying the hospitalizations is clearly an outcomes measure, but it's also a way to support the intervention. The MCC can visit patients or understand better what they're going through."
>
> *— MIND leaders*

participants' visits and electronic medical records (EMRs) data for participants admitted to the hospital. This information will allow MCCs to visit participants in the hospital in a timelier manner and to ensure that they have the supports they need when they return home. Moreover, the awardee plans to increase the communication between MIND clinical staff and caregivers of participants who have been hospitalized (or are at risk of hospitalization) to discuss risks, such as falls, dehydration, and medication mismanagement. Finally, the awardee is planning to have select MCCs take tablets to home visits with high-risk patients so that they can connect directly with clinical staff in real time. These tele-health consultations will allow clinicians to assess a participant's needs firsthand and to provide advice to caregivers for improving clinical outcomes and reducing hospitalizations among participants. MCCs welcomed this support given that most of them do not feel comfortable giving clinical advice.

3. Organizational and external context

Although expanding MIND to Medicare-only participants has improved enrollment, connecting Medicare-only participants with resources proves to be an ongoing challenge. Because long-term care services, such as adult day programs and personal care, are covered by Medicaid, not Medicare, MCCs can offer Medicare-only participants fewer resources than they can offer dual-eligible participants. MCCs report that although the former do not qualify for Medicaid, they often do not have the means to pay for these important services. In addition, some individuals may qualify for Medicaid but have not met the functional eligibility requirements for long-term care. Therefore, MCCs help these individuals access services offered through nonprofit organizations, such as Easter Seals and the Alzheimer's Association. In addition, MCCs can refer these participants to Maryland Access Point (MAP) centers for free evaluations and to other community or state-funded resources.

> "It all boils down to financials—the money for respite . . . or the money for an aide to come in and help, or for adult day care. If participants don't have medical assistance [Medicaid], then they normally can't afford it."
>
> — *MCC*

It is difficult to engage some participants in MIND because of isolation, stigma, and a lack of caregiver support. Although the average number of contacts per participant is 25 over the 18-month life of the program, this number varies significantly by participant. Contact may be less frequent because a participant is hard to reach or not fully engaged in the program. MCCs typically follow up with these participants through phone calls, which may go unanswered and unreturned. Now that enrollment activities are winding down, Johns Hopkins University is turning its attention to these participants by conducting home visits, and by identifying and addressing barriers to participation.

The awardee is planning to work with PCPs to bolster enrollment and improve participant access to medical care, but has met with some resistance. If an MCC or member of the MIND clinical support team recognizes that a participant has clinical needs, the MCC informs the individual's PCP. In addition, Johns Hopkins University has reached out to PCPs so that they will encourage their patients to enroll in MIND. However, some PCPs are not comfortable with their patients being involved in MIND and prefer to work with them independently. Johns Hopkins University hopes that its new partnership with the Medicaid MCO will yield stronger relationships with PCPs.

C. Development of the payment model

Johns Hopkins University made progress in developing its payment model in the second program year. The model includes capitated payments for MCCs and the clinical team, and shared savings with the participating home health agencies. To define the capitated payments, the awardee developed a cost template that captures the monthly salaries of the MCCs and the clinical team, as well as overhead. The capitated payments will be risk adjusted to account for the participants' need for services. Chronic conditions, depression, education, and partner relationships (that is, whether a caregiver is available) are being considered as factors to be included in the risk adjustment model. In addition, given that new participants tend to require more intensive services, Johns Hopkins University may recommend higher payments earlier in the intervention.

The awardee intends to generate savings through the MIND program by reducing hospital and ED use, and by delaying admission into long-term care facilities. Program staff will calculate these savings through a difference-in-difference model, which compares the health care costs of MIND participants to those of a comparison group three years before enrollment and during the 18 months of the intervention. The costs include Medicare ED and hospital costs, and Medicaid long-term care costs. Johns Hopkins University will calculate savings separately for three groups of MIND participants: Medicare-only beneficiaries, partial dual eligibles, and dual eligibles.

The challenges involved in developing the shared savings approach include introducing Medicare-only beneficiaries, obtaining data on health care costs, and establishing a suitable comparison group. Because Medicare does not cover long-term care, there will be no savings from delaying admissions to long-term care facilities for the Medicare-only beneficiaries. Johns Hopkins University is considering using financial information on these participants to calculate the effects of MIND on slowing the spend-down that would bring these participants to a point at which they are eligible for Medicaid, but the overall savings should be lower for this group. In addition, although the introduction of Medicare-only beneficiaries has increased the overall enrollment count, the number of participants in this group may be too small to yield statistically significant results given that shared savings have to be calculated separately for them.

Access to health care cost data also poses a challenge. Johns Hopkins University established a partnership with Maryland Medicaid's claims processor, which provides monthly expenditures and utilization data on MIND participants and the comparison group. (The data are related primarily to hospitalizations and the use of long-term care.) However, for partial dual eligibles, Medicaid pays only for managed care premiums (not co-pays) and therefore does not have access to data on utilization and expenditures. The awardee is researching options for calculating savings for this group.

Finally, identifying an appropriate comparison group has been a challenge because of the complexities related to dementia diagnoses. As mentioned, Johns Hopkins University does not require MIND participants to have a dementia diagnosis in claims data. Therefore, program staff have been concerned that selecting individuals with a dementia diagnosis for the comparison group would result in a group whose needs and utilization are higher than those of the treatment group. Therefore, the staff plan to compare pre-intervention data for MIND participants with and without dementia diagnoses to determine whether the utilization of these two populations is significantly different. These findings will inform the selection of the comparison group.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our summary of the characteristics of the treatment group, which we measured for the year before the intervention began for each beneficiary. Recruitment for the treatment group was conducted through letters to Medicaid beneficiaries, advertising, and referrals from community partnerships or community meetings. Approximately 10 percent of those identified or referred to the program declined to participate. There was a larger drop-off through the screening process. Johns Hopkins University originally targeted only individuals enrolled in Medicare and Medicaid (that is, dual eligibles) for the MIND program. However, approximately 60 percent of those screened were excluded because they were not dually eligible. Another 20 percent were ineligible for other reasons, including not having dementia or not living in the catchment area. Overall, about one in five individuals screened were eligible and about two-thirds of those who were eligible were enrolled. To increase enrollment, Johns Hopkins University expanded the MIND program's eligibility criteria to include Medicare-only beneficiaries, starting in early 2016. The treatment group in this analysis partially reflects the shift in eligibility criteria.

A. Baseline characteristics of the treatment group

Johns Hopkins University began enrolling beneficiaries in the MIND program in March 2015. As of May 2016, the program had 207 participants. Approximately 30 percent of these participants were Medicare-only beneficiaries; the remaining participants were dual eligibles.

For the purpose of presenting baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare fee-for-service (FFS), both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all program criteria for a period of 90 days during the baseline year (the 365 days immediately prior to their enrollment). In addition, beneficiaries had to have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and therefore varies by participant. After we excluded beneficiaries who did not meet the above criteria, 158 participants were included in the analysis of baseline characteristics for this report.

Table 2 shows the demographic characteristics of MIND participants. Nearly all of the participants (92 percent) are 65 or older; 37 percent are 85 or older. The participants are predominantly female (77 percent) and black (66 percent). Most participants (72 percent) became eligible for Medicare through age or survivor benefits. Of the 158 beneficiaries included in the analysis, 129 beneficiaries (82 percent) are dual eligibles. Most of the Medicare-only beneficiaries are new this quarter, reflecting the awardee's decision in early 2016 to include Medicare-only beneficiaries. MIND participants have substantial health care needs. The average hierarchical condition categories (HCC) risk score for MIND Medicare beneficiaries is more than twice the average Medicare FFS HCC score—indicating that they are expected to have much higher costs than the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 158)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	13	8
65 to 74	36	23
75 to 84	51	32
85 and older	58	37
Gender		
Female	121	77
Male	37	23
Race		
White	46	29
Black	104	66
American Indian, Alaska Native, Asian/Pacific Island American, or other	4	3
Hispanic	2	1
Original reason for Medicare eligibility		
Old age and survivor's insurance	113	72
Disability insurance benefits	45	28
End-stage renal disease (ESRD)[a]		
Hospice[b]		
Medicare/Medicaid dual status, percentage dual[b]	129	82
HCC score[c]		Statistic
Mean		2.05
25th percentile		1.05
Median		1.6
75th percentile		2.59

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary consented to be enrolled in the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee for service; HCC = hierarchical condition category

The substantial health care needs of MIND participants are reflected in their high level of baseline health care expenditures and utilization. Table 3 lists a common set of utilization and cost measures, including core measures from the Center for Medicare & Medicaid Innovation. By addressing unmet care needs in the home and reducing caregiver burden, Johns Hopkins University aims to reduce transitions to long-term nursing facilities—which is a cost to Medicaid for dual eligibles. These costs are not included in Table 3. However, the awardee also expects the MIND program to shorten inpatient stays and, in turn, lower health care utilization expenditures among participants. We examined baseline cost of care by calculating average per beneficiary per month (PBPM)[3] Medicare expenditures, in total and by major types of services. The total average PBPM Medicare expenditure during the baseline year was $1,839—more than twice the 2014 national average for Medicare FFS beneficiaries of $792.[4] The average PBPM Medicare expenditure in the baseline year varied substantially from quarter to quarter, ranging from a low of $1,176 in quarter 1 to a high of $2,304 in quarter 2. Medicare expenditures for inpatient services ($709 PBPM) were the largest driver of total cost of care for participants. However, because of the Medicare billing practices in Maryland, the inpatient expenditures likely include psychiatric services and other non-acute inpatient stays, resulting in an inflated figure for acute care inpatient service expenditures. The next highest expenditures for MIND participants were for outpatient services ($339 PBPM) and physician services ($296 PBPM).

For participants, the annual hospitalization rate of 629 per 1,000 beneficiaries is well above the national annual rate of 274 admissions per 1,000 beneficiaries in 2014, though this figure is also likely inflated for the reason stated above. Thirty-five percent of participants were readmitted within 30 days of a hospital discharge, which exceeds the national rate for all Medicare FFS inpatients by more than 15 percentage points. The annual rate of 770 ED visits that did not lead to hospitalization per 1,000 participants was almost 70 percent above the 2014 national Medicare FFS rate of 454 per 1,000 beneficiaries. Furthermore, the annual observation stay rate of 220 per 1,000 participants was nearly four times the observation stay rate of all Medicare FFS beneficiaries in 2013 (60 per 1,000 beneficiaries).[5] Approximately 35 percent of MIND participants had at least one hospitalization during the year prior to enrollment, 40 percent had an ambulatory ED visit at least once, and 21 percent had at least one observation stay. Outside of inpatient and outpatient utilization, MIND participants were more likely to have specialist visits compared to primary care visits—10,135 specialty services used per year per 1,000 participants compared to 7,593 primary care visits per year per 1,000 beneficiaries.

Over the course of the four baseline quarters leading to enrollment, we observed no discernable trend in the average PBPM total payment nor in the average PBPM payments for inpatient, outpatient, and physician services. Overall, the first quarter shows substantially lower

[3] The months referred to in our calculations are 30-day periods rather than calendar months.

[4] Except for ambulatory observation stays, the national cost and utilization data presented here and in the next paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

[5] MedPAC, "A Data Book: Health Care Spending and the Medicare Program," Washington, D.C., June 2015.

levels of inpatient, outpatient and skilled nursing services compared to the other quarters, while the second quarter shows higher utilization for most services. This variability likely results from the small number of participants being observed over this period.

In the next quarterly report, we will continue to provide baseline descriptive statistics for the treatment group. We will also monitor the number and percentage of participants who are dual enrollees. The count and share of these participants will provide us with more information on the likely power that we will have to assess delayed nursing home placement, the primary outcome of the MIND program and the measure most likely to meet the thresholds for minimum detectable effects.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	158	152	156	157	158
Average Medicare expenditures PBPM[a]					
Total	1,839 (265)	1,176 (209)	2,304 (712)	2,115 (384)	1,538 (263)
Acute inpatient	709 (144)	430 (123)	991 (349)	703 (211)	575 (171)
Inpatient other[b]	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Outpatient[c]	339 (69)	194 (34)	459 (273)	439 (187)	259 (42)
Physician services	296 (41)	239 (42)	338 (65)	321 (54)	264 (36)
Home health	180 (25)	135 (38)	167 (38)	184 (41)	218 (42)
Skilled nursing facility	242 (53)	115 (53)	254 (93)	376 (114)	180 (79)
Hospice	37 (25)	38 (32)	57 (40)	47 (35)	7 (7)
Durable medical equipment	36 (8)	24 (6)	38 (44)	46 (14)	36 (10)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	692 (111)	481 (118)	1,061 (362)	587 (124)	584 (138)
Outpatient ED visits	770 (100)	641 (145)	751 (151)	817 (169)	864 (181)
Observation stays	220 (36)	133 (60)	285 (83)	230 (74)	229 (82)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Health care utilization rates (annualized per 1,000)					
Primary care visits in any setting	7,593 (758)	6,407 (839)	8,129 (1,061)	8,116 (1,322)	7,571 (1,018)
Primary care visits in ambulatory settings	5,595 (565)	4,645 (478)	5,488 (677)	6,355 (1,142)	5,767 (765)
Specialist visits in any setting	10,135 (796)	8,596 (893)	11,391 (1,649)	10,617 (1,163)	9,604 (885)
Specialist visits in ambulatory settings	7,406 (607)	6,247 (681)	7,094 (827)	8,040 (1,026)	8,105 (761)
Measures of any health care utilization					
Percentage with a hospital admission[d]	35 (4)	11 (3)	19 (3)	13 (3)	11 (3)
Percentage with an outpatient ED visit[e]	40 (4)	13 (3)	15 (3)	16 (3)	18 (3)
Percentage with an observation stay[f]	21 (3)	3 (1)	7 (2)	6 (2)	5 (2)
Percentage with a 30-day readmission among all discharges	17 (4)	6 (6)	20 (7)	24 (7)	12 (7)
Percentage of participants with a readmission among all participants	8 (2)	1 (1)	3 (1)	4 (2)	2 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Johns Hopkins University

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	335
Projected Medicaid population with 6 months of program exposure	2
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,402
Likelihood of all-cause hospitalizations	1,361
MDE sample size requirement to detect 20% effect	
Total expenditures	601
Likelihood of all-cause hospitalizations	340
Participation/Selection bias of concern	Yes, patient self-selection high or high refusal rate
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, moderate rate of identification of treatment group with claims with some dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Awardee will have extensive 9-, 18-, and 24-month assessments on all participants who remain at home. Assessments include cognitive function, functional dependency, depression, patient quality of life (at 18 months only), neuropsychiatric behavior, caregiver burden, and care satisfaction (18 months only).

We do not expect to have sufficient statistical power to evaluate this awardee's program due to low enrollment of Medicare-Medicaid dual eligibles to assess the primary effect of delaying time to nursing home placement and its associated costs. Absent a rigorous impact analysis, we will explore with the awardee the availability of data that it is collecting at three points during its model testing period (baseline, 9 months, and 18 months) from participants and their caregivers who remain at home. If available and complete, we will report on changes over time in cognitive function, functional dependency, depression, patient quality of life (at 18 months only), neuropsychiatric behavior, caregiver burden, and care satisfaction (18 months only). We will also report on the experiences of staff and participants, based on our surveys.

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V. NEXT STEPS

A. Implementation evaluation

As Johns Hopkins University enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

As of May 2016, the MIND program had 207 enrollees, with a total target enrollment of approximately 300 enrollees. Given that this treatment group offers only low power for detecting impacts on the core measures, we are not proposing to develop a comparison group at this time and do not believe that a rigorous impact evaluation will be possible. The awardee is conducting its own impact analysis with a comparison group based on Medicaid data. We will coordinate with the awardee to monitor its descriptive statistics on the observed delay to nursing home entry for dual eligibles in the treatment and comparison groups and any estimated cost savings. We will also explore the use of the Minimum Data Set to track entrance to nursing homes for both dual eligibles and Medicare-only beneficiaries. Using information from these two sources, we will determine whether there will be sufficient cost savings associated with delayed entry to nursing homes to show statistically significant impacts for the given treatment group size.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, memory care coordinators and research assistants. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.18.

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REPORT

APPENDIX B.18

HCIA Round Two Evaluation: Icahn School of Medicine at Mount Sinai

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Bundled Payment for Mobile Acute Care Team Services (MACT) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Icahn School of Medicine at Mount Sinai's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Mount Sinai made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Mount Sinai addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Mount Sinai's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the MACT program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Mount Sinai is using funding from HCIA R2 to support the MACT program, which was launched on November 18, 2014. Mount Sinai originally proposed to provide acute care services to patients in their homes along with 30 days of post-acute care. However, the program evolved considerably to also provide subacute rehabilitation (SAR), palliative care, observation unit care, and care for patients who are averse to entering the hospital.[2] Mount Sinai considers "acute care at home" to be the umbrella under which "original" acute care, observation unit care, palliative care, and hospital-averse care are provided. SAR is considered to be separate. In program Year 3, Mount Sinai intends to expand the MACT program further by implementing a pediatrics-at-home pilot. The MACT program is intended for adults (age 18 and older) who live at home in Manhattan; are enrolled in certain insurance plans; have a safe home environment; and have sufficient support for or the ability to complete necessary daily activities, such as cooking meals or using the phone to call for help. There are differences between the acute care arm and SAR arm in terms of additional inclusion and exclusion criteria.[3,4]

Potentially eligible patients for the acute care arm are identified by MACT providers in the emergency department (ED), by MACT administrative assistants who review the Mount Sinai electronic medical record (EMR), or through referrals. Once a potentially eligible patient is identified or referred, the MACT physician reviews the patient's clinical information to assess whether the patient is appropriate for the program and then discusses the option with the

[2] The program has two arms: acute care and SAR. The acute care arm includes four subgroups: (1) "original" acute, (2) observation unit, (3) palliative care at home, and (4) hospital averse at home. The SAR population does not have subgroups. This narrative speaks broadly to the two high-level groupings: acute care and SAR. If any information is specific to an acute care subgroup, the subgroup is specifically mentioned. The intervention for the acute care, palliative-care-at-home, and hospital-averse patients includes a short acute care phase of approximately 3.2 days and a 30-day post-acute care phase, totaling to about 33.2 days of care. For patients in the observation unit at home, the intervention has a shorter acute care phase and a 30-day post-acute care phase. The SAR patients receive 30 days of MACT care, including approximately 20 days of SAR care and 10 days of post-SAR care.

[3] There are a few differences in the eligibility criteria for the acute care and SAR arms. For the acute care arm, eligible participants must (1) be enrolled in Medicare fee-for-service (FFS), HealthFirst Medicare, HealthFirst Medicaid managed care, or the HealthFirst health maintenance organization; (2) meet the Milliman Care Guidelines (MCG) a set of evidence-based guidelines that help to support decision making related to admitting patients to the hospital; and (3) qualify on the basis of modified Hospital at Home inclusion and exclusion criteria. There are two sets of acute care exclusion criteria: those that are applicable to all conditions and those that are condition specific. The all-condition exclusion criteria are generally based on needs for clinical services, such as critical care. Condition-specific exclusion criteria are very detailed. For example, for patients with heart failure, the exclusion criteria would be having a recent definite or suspected myocardial infarction or pulmonary embolism. Until recently, the MACT program also had medical condition criteria for the acute care arm. A patient had to have at least one of the following eight conditions: (1) congestive heart failure (CHF) or heart failure, (2) chronic obstructive pulmonary disease (COPD) or asthma, (3) dehydration, (4) diabetes, (5) pneumonia, (6) cellulitis, (7) urinary tract infection, or (8) pulmonary embolism or deep vein thrombosis (DVT). For the SAR arm, patients must be enrolled in Medicare FFS or be dually eligible and their physical therapist, physician, or social worker must indicate that they need subacute rehabilitation services.

[4] During the acute care phase, patients receive services necessary for their condition, including hospital-level services, such as antibiotics by IV; therapy services, such as physical, occupational, and speech therapy; and social work services. Although acute care normally consists primarily of hospital services and SAR care is primarily therapy, the mix of services depends upon the patient's needs.

patient's care team. If the providers agree that the patient would be a good candidate for the acute care arm, the MACT physician discusses the program with the patient and his or her caregivers and then determines whether it is safe to send the patient home. If the patient agrees to participate and has a safe home environment,[5] then the patient is enrolled into the acute care arm and preparations for sending the patient home from the ED begin.

The enrollment process for SAR patients is similar, though they are referred to the MACT program by a caseworker, a social worker, or other health care professional. MACT administrative assistants do not review the EMR for potential SAR participants. One additional difference between the acute and SAR enrollment processes is that SAR patients are primarily discharged from their inpatient floor into the SAR arm of the MACT program rather than from the ED.

The MACT program is led by a project director who is supported by a clinical leadership team. In addition, MACT leaders convene a steering committee twice a year to inform the committee of the program's progress, to discuss challenges and solutions, and to obtain feedback on upcoming activities. This committee is composed of one representative from the home health agency (HHA) that contracts with Mount Sinai; one representative from HealthFirst, the insurance plan that is partly owned by Mount Sinai; two community members; and 11 individuals from various parts of the Mount Sinai system, such as the Department of Geriatrics and Palliative Care, who have ties to the MACT program.

Mount Sinai intends to serve 1,080 patients during its three-year cooperative agreement.[6] Through the MACT acute arm, the awardee expects to (1) reduce the costs to CMS by more than 50 percent for the 30-day episode of care (compared with the 30-day cost of care for a person with similar health problems who is admitted to a traditional hospital), (2) produce health outcomes that are as good as or better than outcomes the participant would have had if hospitalized, (3) meet or exceed national quality benchmarks for general and disease-specific acute and post-acute care, and (4) achieve participant satisfaction scores that are equal to or better than the scores in a comparable hospitalized group.[7]

Mount Sinai is developing payment models for patients with Medicare fee-for-service (FFS) or managed care plans. Mount Sinai is designing the Medicare FFS model to align with the physician-focused payment model requirements from the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA). This model could be used to obtain payment for the acute care and post-acute care phases for each of the three acute care arms: original acute care, observation unit, and palliative care. Mount Sinai is also working with interested Medicare Advantage and managed care payers to create payment models that align with the payers' needs. Mount Sinai is exploring options with these payers to bill services as either a discounted diagnosis-related group (DRG) with physician fees included or as a three-tiered bundled

[5] The home environment is assessed through a patient questionnaire, which collects information on, for example, whether the home is free of illicit drugs and firearms, as well as bedbugs.

[6] The 1,080 figure includes all of the MACT services.

[7] Outcomes mentioned here are for the MACT acute care arm. Outcomes for the SAR arm have not yet been identified.

payment. In the tiered model, the default would be the middle tier, with Mount Sinai defining the circumstances under which billing would be reduced to the lower tier or enhanced to the upper tier. To date, the managed care plans' models primarily focus on the acute care phase of the original acute care population, though there is potential to obtain payment for providing care to the observation unit population in the three-tiered bundle rate. Although Mount Sinai has experienced challenges related to how to bill for MACT services that are not considered strictly inpatient or outpatient care, it continues to develop these payment models in the interest of sustaining the MACT program after the cooperative agreement ends.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Mount Sinai during the first year of its cooperative agreement.

- The awardee developed an infrastructure for delivering acute care services at home, which can now be expanded to include SAR services. The program also provides observation unit and palliative care services to a limited number of participants.
- Providing acute care in the home encourages patient engagement and shared decision making between MACT clinicians, patients, and the patients' caregivers.

We also identified several initial challenges in implementing the program and Mount Sinai's strategies for addressing them.

- Recruitment and enrollment have been persistent challenges, although program staff have used several strategies to address them. They added SAR, palliative care, and observation unit services; expanded eligible clinical diagnoses and removed exclusion criteria; and increasingly relied on referrals to recruit acute care and SAR patients.
- It was challenging to obtain adequate services from many outside vendors, who are accustomed to working normal business hours, not the around-the-clock schedule necessary for the MACT program to provide services, medications, and supplies in the home. In response, MACT staff changed some vendor agreements and are relying more on internal pharmacy and lab services.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Mount Sinai made progress in the following areas:

- Mount Sinai reached 29 percent of its three-year enrollment target.[8]
- The awardee hired nurses employed by its own health system to provide all nursing care, discontinuing its contract with an outside HHA to provide nursing and infusion services.

[8] Mount Sinai noted that the percentages of three-year projected total participants served, as calculated by the implementation and monitoring contractor, are not considered an accurate representation of its progress. Mount Sinai pointed out that, since it launched its program, it has expected enrollment levels to incrementally increase as it ramped up to full capacity. The awardee suggested that the percentage should be calculated by using the target participant level expected by the current reporting quarter rather than using the three-year total as the denominator.

The awardee also improved program efficiency by restructuring the staff's responsibilities, standardizing care processes, and changing workflows to support growing enrollment.

- Mount Sinai continues to develop multiple payment models for both the Medicare FFS and managed care plans. Mount Sinai is designing the Medicare FFS model to align with the MACRA physician-focused payment model requirements. This model could be used to obtain payment for the acute care and the post-acute care phases of three of the acute care arms—the original acute care, the observation unit, and the palliative care populations. Mount Sinai is also working collaboratively with the managed care plans to develop payment options, including a discounted DRG that includes physician payments and a three-tiered bundled rate. The managed care plans' models primarily focus on the acute care phase of the original acute care population, though there is potential to obtain payment for care of the observation unit population in the three-tiered bundle rate.

Below we note the key challenges that Mount Sinai has worked to address in the second year of its cooperative agreement.

- Mount Sinai found it challenging to obtain up-to-date clinical information on SAR patients because their MACT care consists primarily of therapy services provided by an outside vendor. This situation has been particularly concerning for the MACT team when the medical condition of a SAR patient deteriorates, yet the vendor's staff do not inform the MACT team on a timely basis. As a result, the MACT clinical team becomes aware of a decline in a patient's condition much later than it should. In response, Mount Sinai has implemented a standardized data template through which the therapists regularly send consistent information to the MACT team. The awardee also began scheduling weekly clinical visits with SAR participants to better understand their health status. Finally, the awardee has decided that starting in Year 3 it will hire its own physical therapists to provide therapy services and to oversee the care provided by the outsourced occupational and speech therapists.
- Program staff continue to refine their use of the Epic EMR such that it dovetails with the unique needs of the MACT program, which includes features of both inpatient and outpatient health information technology (health IT) documentation. They also continue to work with Mount Sinai health IT system staff to customize their EMR tools to the MACT program in order to efficiently track orders and ensure that all team members can communicate seamlessly.

As Mount Sinai enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Current Medicare payment regulations restrict Mount Sinai's ability to bill for MACT services.
- Because it is difficult to categorize the MACT services as purely inpatient or outpatient, it is challenging to determine whether the services should be billed to Medicare Part A (inpatient) or Part B (outpatient).

- Given the novelty of the payment model and the complexity of the billing regulations, Mount Sinai's payment models are focused on the acute care arm of the MACT program. The team plans to develop payment models for the SAR arm in the future.

Table 1. Mount Sinai: MACT program characteristics at a glance

Program characteristic	Description
Purpose	The MACT program provides acute, post-acute, and SAR services in a patient's home.
Components	Home care, care coordination, patient and family engagement, shared decision making, health IT
Target population	Acute/palliative/observation/hospital-averse beneficiaries: People who present to Mount Sinai and targeted outpatient settings, meet the Milliman Care Guidelines admission criteria for their conditions, live at home in Manhattan, and can be safely cared for at home SAR beneficiaries: People who are discharged from Mount Sinai Hospital, are referred for SAR based on clinical and SAR needs, live at home in Manhattan, and can be safely cared for at home
Theory of change/theory of action	Services for both the acute care and SAR arms may include radiology; lab work; nursing; durable medical equipment (DME); pharmacy and infusion services; telemedicine; and physical, speech, and occupational therapy. The provision of home care is intended to increase participant satisfaction and result in lower costs, superior processes, and better clinical health outcomes.
Payment model	Value-based payments, shared savings, bundled or episode payment
Award amount	$9,610,517
Launch date[a]	11/18/2014
Setting	Participants' homes
Market area	Urban
Market location	Manhattan, NY
Core outcomes (acute care arm)	**Clinical outcomes** • Decrease complications of care (for example, reduce the use of physical or chemical restraints; reduce the rate of falls, pressure ulcers, and nosocomial infections) • Shorten the length of stay (for example, the average length of stay in the MACT acute care phase [at home] compared with the average length of a hospital stay for a similar set of patients) • Improve care process measures (for example, increase the percentage of patients with chronic obstructive pulmonary disease [COPD] who were prescribed an inhaled bronchodilator at discharge) • Decrease the mortality rate (for patients in all MACT arms except palliative care at home) **Cost and resource use** • Decrease 30-day unplanned readmissions • Decrease all-cause hospitalizations • Decrease total Medicare Part A and B payments • Decrease rate of hospital ED visits **Care experience** • Increase patient satisfaction (modified Hospital Consumer Assessment of Healthcare Providers and Systems)

[a]After the initial planning period, the awardee's program began to operate as of this date.

ED = emergency department; FFS = fee-for-service; IT = information technology; SAR = subacute rehabilitation

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Mount Sinai in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during in-person and telephone interviews with program staff from July 18 through July 21, 2016. For the analyses of Mount Sinai's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct in-person and telephone interviews with the following program staff:

- The MACT program director
- Eight MACT clinicians, including physicians, nurses, nurse-practitioners, and social workers; several of these clinicians, such as the clinical director of the program, also serve in leadership roles
- One Mount Sinai clinician who is not affiliated with the MACT program but refers potentially eligible patients to the program
- One Mount Sinai physician assistant who is not affiliated with the MACT program but who recruits beneficiaries for the program
- One representative from the HHA that Mount Sinai contracted with to provide therapy services, including physical therapy and occupational therapy
- One member of the steering committee that advises the MACT program

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[9] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

[9] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation, on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Mount Sinai's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

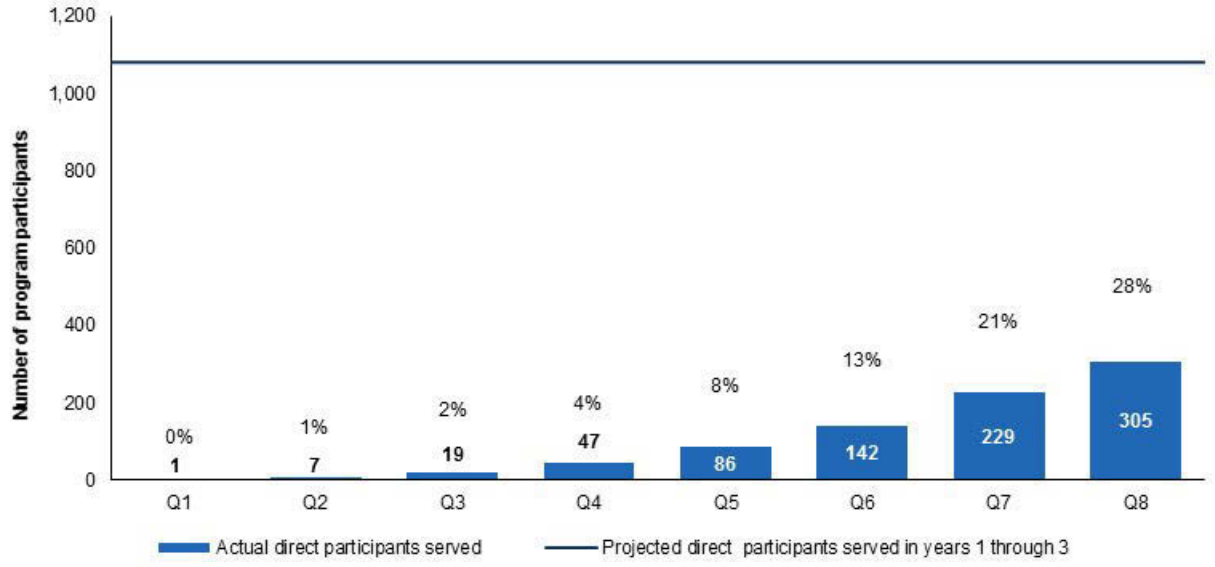
A. Program enrollment

Mount Sinai reported to the implementation and monitoring contractor that it directly served 305 participants from November 2014 (the launch of its program) through August 2016, which represents about 28 percent of its 1,080 projected direct participants (Figure 1). The baseline characteristics of participants whom we were able to identify in Medicare FFS enrollment and claims data are presented in Section IV.

This progress was influenced by several factors. First, Mount Sinai relaxed the inclusion criteria to allow MACT team physicians more clinical judgment in determining which patients the MACT team could safely treat at home regardless of whether they had one of the original eight MACT clinical conditions.[10] However, because the set of conditions captured the types of patients whom the MACT team is comfortable caring for at home, most patients deemed eligible for the MACT program did have one of the original eight conditions. Before relaxing the criteria, MACT clinicians already exercised substantial flexibility in interpreting the list of eligible conditions. The team had been interpreting the dehydration diagnosis liberally in order to enroll patients whom they felt were appropriate for the program. For example, physicians would categorize patients with gastroenteritis (the stomach flu) who needed IV fluids (and therefore an inpatient level of care) as having dehydration to fit the diagnosis-related eligibility criteria. Finally, physicians were also conscious of the clinical judgment involved in selecting the route through which to administer antibiotics (whether oral or intravenous), choosing the latter when oral administration might also have been reasonable but there would be additional care-related advantages for the patient if he or she were enrolled in MACT.

[10] The conditions are CHF or heart failure, COPD or asthma, dehydration, diabetes, pneumonia, cellulitis, urinary tract infection, and pulmonary embolism or DVT.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Icahn does not have indirect participants. In the most recent report from the implementation and monitoring contractor, Icahn commented that the percentages of three-year projected total participants served, as calculated by the implementation and monitoring contractor, were not an accurate representation of its progress. Icahn noted that, since the onset of its program, it has expected enrollment levels to incrementally increase as it ramped up to full capacity. Icahn suggested that the percentage should be calculated using the target participant level expected by the current reporting quarter rather than using the three-year total as the denominator.

Second, the MACT team shifted its recruitment efforts to Mount Sinai Hospital for both the acute care and SAR arms rather than also trying to recruit for the acute care arm from Mount Sinai–St. Luke's Hospital. (The MACT team has neither tried nor does it plan to recruit for the SAR arm from other hospitals.) The decision to focus recruitment efforts on Mount Sinai was made because the team learned that a significant amount of time, face-to-face interaction, and MACT staff presence was necessary for a hospital's staff to understand the MACT program. In addition, the MACT team was unable to devote the required resources to successfully recruit from another site. The MACT team also acknowledged that to meet its enrollment targets—and to successfully sustain and scale the program—the program would have to be implemented in another Mount Sinai hospital during the final year of the cooperative agreement. Mount Sinai considered expanding to one of the following three hospitals: Mount Sinai–St. Luke's, Mount Sinai–Beth Israel, or Mount Sinai–West (formerly Mount Sinai–Roosevelt). To make the selection among the hospitals, the MACT team assessed (1) the size of the population of patients who meet the payer criteria; (2) convenience of location in relation to Mount Sinai Hospital; and (3) other circumstances that would make the hospital especially favorable for the MACT program, such as an established visiting doctors' program or a supportive hospital culture and

motivated leaders. Mount Sinai eventually decided to reinitiate recruitment from St. Luke's rather than begin recruitment at one of the other two Mount Sinai hospitals.

Third, the MACT team has found new ways to enroll more acute care patients. The ED is a challenging environment in which to recruit for the acute care arm because there is only a small window of time in which providers can consider evaluating patients and enrolling them in the MACT program. (In contrast, discharge from an inpatient floor is a slower process, so MACT or other staff recruiting for the SAR arm have more time to talk with patients and suggest the MACT program as a potential next step in the patients' care.) Beginning in spring 2016, the MACT team, on a pilot basis, hired and trained eight physician assistants who work in the Mount Sinai ED to moonlight for the MACT program on top of their regular jobs. When moonlighting for the MACT program, the physician assistants assist with recruitment for the acute care arm from noon to 8:00 p.m. The MACT team expects that this pilot will have three benefits. First, the physician assistants will be able to recruit patients after regular business hours, which should increase enrollment. Second, because the physician assistants normally work in the ED, the ED staff may be more inclined to reach out to them about potential MACT participants. Third, because the physician assistants have been moonlighting for the MACT program, they may be more likely to refer patients to the program while working their regular (non-MACT) shift in the ED.

> "[The pilot is] trying to have the PAs—who work in the ED who know the flow, know the attending [physicians], know the system—to be able to get out there and try to recruit more patients to try to increase enrollment into the MACT program."
>
> *— Mount Sinai clinician*

Finally, although the MACT team has implemented a number of strategies to improve enrollment, several external factors have negatively affected recruitment into the acute care arm. Although these factors were unavoidable, the MACT team recognized them and developed strategies to deal with them. One important factor in the patients' willingness to participate in MACT is the extent to which they have support at home. MACT clinicians noted that patients who have a caregiver at home or from a home care agency are more willing to participate in MACT. However, patients who themselves have caregiver responsibilities at home fear that they cannot recover at home as they could in the hospital and are therefore more likely to refuse to enroll in MACT.

To address these concerns, the MACT team has offered a limited amount of home care to potential participants who do not have enough support at home but who otherwise meet all eligibility criteria for the program. The team has become adept at identifying the need for home care and whether the MACT program can cover the amount of care that is needed. MACT staff have also observed that patients recruited from the ED (which tends to be loud and crowded, and therefore unsettling to patients) tend to be more willing to participate in MACT compared with patients in the calmer and quieter observation unit. The MACT staff have therefore had more success recruiting from the ED than from the observation unit.

B. Implementation of the service delivery model

Mount Sinai made significant changes to the service delivery model in the second program year. Nurses were hired by Mount Sinai for the MACT program to provide services in participants' homes. This gave program leaders more control over the workflow and the

scheduling of nursing services, compared with when they contracted with an HHA for these services. To make the program more efficient as enrollment grows, Mount Sinai also restructured staffing responsibilities, standardized care processes, and changed workflows. The awardee continued to refine its Epic EMR system to best support the intervention, including developing standardized templates for clinical staff.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Nursing services are the most prominent intervention characteristic that affected the implementation of the service delivery model. MACT leaders hired Mount Sinai–employed nurses rather than contracting for nursing care with an external HHA. This allowed MACT staff to (1) recruit participants later in the day;[11] (2) provide better continuity of care to participants because one Mount Sinai nurse could meet all of a patient's nursing needs, whereas the same care could require two HHA nurses because of the agency's structure; (3) enjoy better and more seamless communication with each other, especially the nurses, the MACT physicians, and the nurse-practitioners; and (4) benefit from nurses whose time was fully devoted to the program and its participants, compared with the HHA nurses, who also had a non-MACT caseload.

The MACT team admits that it has had to gradually learn what is entailed in home-visiting nursing for both the acute care and SAR arms, as the Mount Sinai system does not have an HHA, and the care provided to a MACT patient is different from care provided through both traditional inpatient and home health care. For example, the MACT team believes that its nurses must be particularly autonomous and able to advocate for themselves and their patients. The recruitment of nurses must also be consistent with staffing needs; however, the MACT team has found it difficult to specify the optimal number of MACT nurses for a shift because the level of need is based on enrollment numbers, the participants' clinical severity, and their unique needs (some care requires more time than others). If the MACT team encounters a nursing shortage, it can use a per diem contract nurse, a MACT nurse-practitioner, or a nursing agency that Mount Sinai contracts with for infusions.

[11] The advantage here is that, because the HHA nurses end their workday in the afternoon, nursing services would not be available for patients recruited late in the day until the following day.

2. Implementation processes

Since last year, the MACT team has used several strategies to support the implementation of the program. The approach has been successful thus far. For instance, the team has standardized care processes to improve the workflow in the intervention. When the MACT program first started, the team followed a different clinical protocol for each of the target conditions. However, the staff found that most participants have more than one clinical condition, so they stopped using disease-specific protocols and began to standardize care processes for all acute care patients regardless of condition. For example, the MACT team is standardizing how nursing orders should be placed, how people communicate, how care is tracked, and how discharge planning occurs. The team also standardized aspects of the post-acute care phase. For example, all participants now receive one standard check-in phone call during the post-acute care phase. Otherwise, patients are encouraged to reach out to the MACT team if their health status changes or medical problems arise during this time; a clinician will triage the issue over the phone or send a nurse or physician to visit the patient, if necessary. During this post-acute care phase, patients are also encouraged to follow up with their regular primary care provider to receive non-acute medical care. In addition, many commonly prescribed medications are now stocked in the MACT program office to allow for MACT enrollment outside of external pharmacy business hours, and the team has streamlined the processes for ordering durable medical equipment.

> "We need to be prepared for those unexpected phone calls that we have for a patient. Every day varies. We can't say, 'Today you'll come in, you'll see three patients. Then you're going to come back and help with referrals.' That could change depending on whether the patient is in the acute or the subacute phase of our program."
>
> *— MACT clinician*

Finally, Mount Sinai developed several standardized templates within the Epic EMR to ensure that proper information is communicated to team members (for example, templates related to implementing the process necessary to hold a potential participant in the ED overnight for patients recruited after the MACT team left for the day).

To increase program efficiency, the awardee restructured its staffing responsibilities. Whereas roles such as recruiting and home visit activities were once assigned daily on an ad hoc basis, the team streamlined this process by assigning a set of responsibilities to each clinical team member that remained the same every day. This new configuration also makes the most of each person's area of expertise. Administrative assistants review the ED patient list to identify patients who live in Manhattan and are insured by a participating or eligible payer. The physician recruits MACT eligible patients for the acute care arm from the ED. One nurse-practitioner stays in the office to triage issues, while one nurse-practitioner and one or two nurses conduct the home visits. As noted, this new structure includes an office-based nurse-practitioner who is on duty several days per week and helps with care coordination, which allows the MACT physician more time for recruiting. Although the roles and responsibilities are consistently assigned to certain staff, the team continues to be flexible enough to provide care whenever it is necessary, which helps with the workflow and scheduling. Because "every day is different," the team is able to handle a range of clinical situations and is prepared for varying levels of patients' clinical severity.

Mount Sinai continues to contract with an external HHA for all therapy services, which include physical therapy (PT), occupational therapy (OT), and speech therapy (ST). However, outsourcing this portion of the MACT program has presented several challenges, including: (1)

costs associated with outsourcing care, (2) communication barriers, and (3) the limited ability of the MACT team to monitor care plans and functional outcomes. With regards to the latter two challenges, Mount Sinai clinicians may only see SAR patients once or twice during their MACT enrollment, whereas the HHA therapists see them frequently. Therefore, the majority of clinical information, including updates related to any potential deterioration of a patient's medical status, is compiled by the HHA therapists. Mount Sinai clinicians felt that they could obtain more timely updates on participants' health status by being in closer contact with participants, because the HHA therapists did not always call in to the MACT daily huddles.

To address challenges that arose from outsourcing the MACT therapy services, Mount Sinai modified the program in three ways. First, Mount Sinai enhanced communication with its HHA partners to address the timeliness and consistency in reporting on the health status of SAR patients. Mount Sinai implemented a brief standard set of questions for the therapists to report on weekly for each patient regarding functional status, clinical concerns, and expected discharge date.[12] Second, Mount Sinai clinicians implemented weekly clinical visits to SAR patients to ensure that the MACT team was obtaining a better understanding of patients' progress. Finally, Mount Sinai decided that, starting in Year 3, it would hire its own PTs to provide therapy services and to oversee the care provided by the contracted OTs and STs.

MACT staff recognize the importance of engaging community care and service providers to make sure that services not typically needed for discharges from the ED, but critical to MACT, do not "fall through the cracks" when a MACT acute care participant is sent home from the ED. For example, the participant may need a hospital bed delivered to his or her home immediately when he or she is discharged from the ED. Similarly, medical supplies may need to be delivered to the home by a particular time. The MACT team also found that although some problems may not have been preventable at the time, it put solutions in place to make sure that the issues do not happen again. For example, if a transportation service does not pick up a patient on time for a visit to a specialist, the MACT social worker will call the transportation supervisor to identify ways to avoid these challenges in the future.

Mount Sinai also continues to refine its use of the Epic EMR for the MACT program. When MACT was first being implemented, program staff noted that the health IT tools they needed were somewhat of a hybrid between those used in the inpatient and outpatient settings. However, they had to choose between the two, and they decided on the outpatient IT software. After using the system and gaining experience in the MACT program, the team now believes that the inpatient tools would be more appropriate. For example, the inpatient communication tool that physicians and nurses use to share information is more aligned with the MACT program's needs. Therefore, the team is now developing software tools within Epic that are common in an inpatient setting.

[12] Care is different for participants in the SAR arm than for those in the acute care arm. SAR is primarily focused on physical therapy (typically one or two hours per day). But depending on participants' needs, they may also receive many of the same services that the acute care participants do (for example, lab, pharmacy, and infusion services, as well as DME delivered to the home). This arrangement is analogous to how traditional inpatients in a skilled nursing facility receive the same inpatient services as hospitalized patients do, such as nursing and phlebotomy, but with a much greater emphasis on physical therapy.

3. Organizational and external context

Support from the Mount Sinai Health System has been vital to the implementation of the MACT program. The MACT team has continued to receive support from the health system's leadership team and from Mount Sinai's legal, billing, and contracting departments. In the second program year, the steering committee has continued to offer guidance on the program's implementation, focusing heavily on the development of the MACT payment models. Program leaders continue to forge and strengthen relationships with multiple hospital units, including the ED, the observation unit, the finance department, and the Office for Excellence in Patient Care.

Being located in New York City can present challenges for staff who are trying to travel efficiently to participants' homes. The subway, taxis, and Uber can each be challenging when staff are trying to maximize the number of visits they can make in a day while also carrying medical supplies. Clinical staff reported that they try to plan their visits in a way that is most efficient based on geography and participants' needs (for example, for a participant who needs an infusion multiple times a day, the staff must plan their visits accordingly). The MACT team is accustomed to this way of working, but these geographic and logistical considerations are important for both ensuring that the teams work together flexibly (in case a team member needs backup coverage) and considering whether and how to scale the program to other regions of New York City.

C. Development of the payment model

Mount Sinai has been developing payment models simultaneously for Medicare FFS and managed care plans. New payment models must be created to sustain MACT services because current regulations restrict Mount Sinai's ability to bill for hospital-level services provided in a home setting. Mount Sinai has been flexible with the model parameters to fit the needs of the payers. This flexibility has resulted in the development of one model for Medicare FFS and two models for managed care plans.

The Medicare FFS model was developed to align with the requirements of the MACRA physician-focused payment models (PFPM). Therefore, the model includes quality metrics, the use of certified EMR technology, and acceptance of nominal financial risk. To satisfy the first two criteria, Mount Sinai has begun identifying quality metrics that align with the PFPM requirements and has been using and updating the program's Epic EMR tools. To align with the requirement of accepting financial risk, the model includes a shared savings component.

This FFS payment model includes a bundled payment for the acute care phase and the 30-day post-acute care phase. The bundled payment will be priced as a discounted DRG. Unlike most DRGs, this DRG will be inclusive of MACT physician payment.[13] The bundle will include most of the MACT services, with a few exceptions such as hospital inpatient readmissions and the time of home health aides beyond four hours. To assess whether this model resulted in a savings, the MACT patients' 30-day costs will be compared to the 30-day costs of a similar group of non-MACT patients. If a savings is achieved, CMS will receive a 3 percent savings; the remaining savings will be shared between CMS and Mount Sinai.

[13] To date, patient stays in the MACT program span over 20 different DRGs.

The Medicare FFS model will allow Mount Sinai to provide services for three of its target populations, including those receiving original acute care, palliative care, and observation unit services. Original acute and palliative care patients will be included in the bundle as described above; however, palliative care patients will be identified in advance of enrollment and may be removed from quality metrics that are not relevant for their circumstances. The observation unit at home patients, who are not converted into acute care (patients with stays of less than two days), will still receive MACT services but these services will be billed as Medicare FFS, similar to what is done for Mount Sinai's Visiting Doctors program. SAR and hospital averse at home patients will not be included in this payment model. Mount Sinai is also working with approximately six Medicare Advantage or other managed care plans to design payment model options. The two main preliminary models are a discounted DRG inclusive of physician payments and a three-tiered bundle rate. These models are being designed for the acute care phase of the acute care arm. Payment models for the post-acute care phase of the acute care arm and for the other MACT arms will be developed in the future.

The managed care payment model that is currently receiving the most interest by payers is a discounted DRG that includes physician payments. The MACT team explained that because the New York State Department of Health has specified that a hospital cannot designate a patient's home as the place of service, Mount Sinai cannot bill for the MACT team's services as a hospital DRG. However, the awardee has identified two billing options that may allow it to obtain DRG-level payments for MACT services. The first option is to bill the entire at-home hospitalization for the discounted DRG amount as a one-time tray fee. Tray fees are a billing option through which providers get paid for completing a significant procedure in their office, inclusive of their supplies and nursing staff's time. Tray fees are considered outpatient care and are paid through Medicare Part B, which means if this option were used to pay for MACT hospital-level care, which is normally paid by Medicare Part A, it would instead be funded through Medicare Part B. One complication associated with this option is that Medicare Part B includes a 20 percent co-pay, which is higher than the Part A co-pay. Mount Sinai has been working toward identifying ways to waive the co-pay or to make it equal to the Part A amount. The second billing option is to go through the Medicare Advantage plans' enhanced benefit bidding process through which the MACT program would be offered as an enhanced benefit by each of these plans.[14] The bidding process would occur in April 2017 for the 2018 calendar year. However, even if the payment model were approved as an enhanced benefit, there would be a four-month gap in which the MACT team would not be reimbursed for services because Mt. Sinai's cooperative agreement ends on September 1, 2017.

The second model being developed as an option for the managed care payers is a three-tiered bundled payment rate. The middle tier would be the default for most patients in the acute care arm, while the lower tier would be reserved for patients who receive observation unit at home services and for those who try the MACT program but cannot be cared for at home and

[14] Each Medicare Advantage plan would submit a bid based on estimated costs per enrollee for covered services under Medicare Parts A and B. Bids are compared to benchmark amounts for a given region (the maximum amount Medicare will pay the plan for this region). If the bid is higher than the benchmark, enrollees pay the difference in a monthly premium. If the bid is lower than the benchmark, the plan and Medicare split the difference (the plan must use this "rebate" to provide supplemental benefits). The Medicare Advantage plan would have to include MACT as one of the services that it considers for the estimated cost per enrollee.

must be readmitted to the hospital. The higher tier would be for more costly patients who meet specific criteria to be decided upon by the payer and Mount Sinai, such as the need for infusion services.

Mount Sinai leaders have also begun to explore options for using the MACT program to provide acute care at home for Veteran Affairs (VA) patients. Mount Sinai is working with its affiliated VA hospital to identify payment options that would allow this hospital to contract with Mount Sinai for MACT services. However, legislation related to outsourcing VA care is written so that non-VA providers are paid at the Medicare rate for contracted services. This causes a problem because there is no Medicare rate for MACT services. The MACT team has begun to investigate creative ways in which the VA could pay for MACT care but has found thus far that this payment process appears to be imperfect and would potentially create compliance issues.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section summarizes the common and awardee-specific claims-based outcomes at baseline for the treatment group, which we measured for the 12 months before each beneficiary's enrollment date in MACT. As of the end of May 2016, the program had 240 participants, including 140 participants for the four subgroups of the acute care arm ("purely" acute, 105; observation unit, 10; palliative care at home, 7; hospital averse at home, 18) and 100 participants for the SAR arm. Given the small sample sizes for three of the four acute care subgroups, for the purpose of this evaluation, we focused on the "purely" acute population for the acute care arm and the SAR population for the SAR arm. Because the need for medical care and the services provided in each arm are significantly different from one another, we evaluated each arm separately.

A. Baseline characteristics of the treatment group

SAR arm. In presenting the baseline characteristics, we restricted the intervention group to adult (age 18 and older) beneficiaries in Medicare fee-for-service (FFS), Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. Each individual's enrollment date is determined by the start of Mount Sinai's SAR care at home. The calendar period covered by the baseline quarters is determined by the enrollment date for each participant and therefore varies by participant. After we excluded beneficiaries who did not meet the above criteria, 95 participants were included in the analysis of baseline characteristics for this report.

The Medicare FFS beneficiaries participating in the SAR arm of the MACT program in its first nine months of operation were a predominantly elderly group with significant, high care needs (Table 2a). More than half of the recruited beneficiaries were older than 85 (58 percent); only 3 percent were younger than 65. A majority of participants were originally eligible for Medicare based on age (85 percent), while 14 percent were eligible because of a disability. In addition, 22 percent were dually eligible for Medicare and Medicaid, which indicates a high level of social need, considering that 18 percent of beneficiaries nationwide are dually eligible. Participants were far more likely to be female (62 percent) and white (75 percent). Overall, Mount Sinai was recruiting a population in poor health whose Medicare expenditures would likely be high in the future, as evidenced by the fact that the average hierarchical condition category (HCC) risk score for participants (3.2) was more than triple the average score for Medicare FFS beneficiaries nationwide (1.00).

Consistent with their high needs, participants in the SAR arm had high rates of Medicare expenditures and service use in the year prior to enrollment, particularly in the last quarter. Table 3a shows baseline utilization and expenditure data for a common set of measures, including the four Center for Medicare & Medicaid Innovation (CMMI) core measures. We examined the baseline costliness of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. The total average PBPM Medicare payment

during the baseline year was $4,700. The average PBPM Medicare payments for inpatient care ($2,730), physician services ($767), and SNF ($471) were the largest drivers of the total cost of care, representing 84 percent of this cost. Through the SAR arm, Mount Sinai expects to reduce expenditures on high-cost services in the SNF setting relative to what would have occurred absent the program by offering convenient SAR services at home. If reductions in the utilization of these high-cost services are realized, then the awardee should see a similar decline in Medicare expenditures.

The average utilization of expensive Medicare services before enrollment was also high, particularly in the last quarter. Nearly all participants (93 percent) were hospitalized, resulting in an annual rate of acute care hospitalizations of 2,184 per 1,000 participants during the baseline period.[15] ED utilization was also high. Forty-five percent of participants visited an ED in the baseline year, leading to an annual rate of outpatient ED visits of 834 per 1,000 participants. Similarly, the 30-day unplanned readmission rate for participants was 39 percent per discharge, or 12 percent per participant, which is much higher than the national rate of 18 percent per discharge. These findings indicate that there may be a sizeable opportunity to reduce potentially avoidable admissions, ED visits, and readmissions during the intervention period by providing effective SAR and nursing services at home. At the same time, participants had high rates of primary care utilization (13,026 primary care visits per 1,000 participants per year) and specialty care utilization (28,718 specialist visits per 1,000 participants per year).

There was a dramatic rise in expenditures and utilization in the last quarter before enrollment, corresponding to the high probability of hospitalization. As shown in Table 3a, the total average PBPM Medicare payment rose from 2,265 in the first quarter of the baseline year to 10,088 in the last quarter before enrollment.

Acute care arm. In presenting the baseline characteristics, we restricted the intervention group to adult (age 18 and older) beneficiaries in Medicare FFS, Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. Each individual's enrollment date is determined by the start of Mount Sinai's acute care at home. The calendar period covered by the baseline quarters is determined by the enrollment date for each participant and therefore varies by participant. After we excluded beneficiaries who did not meet the above criteria, 71 participants were included in the analysis of baseline characteristics for this report.

The Medicare FFS beneficiaries participating in the acute care arm of the MACT program in its first nine months of operation were a predominantly elderly group (Table 2b). Three-quarters of the recruited beneficiaries were 75 years or older. Most participants were originally eligible for Medicare based on age (82 percent), while 17 percent were eligible because of a disability. In addition, 28 percent were dually eligible for Medicare and Medicaid, which indicates a high level of social need, considering that 18 percent of beneficiaries nationwide are dually eligible.

[15] The three-day inpatient hospital stay required for a covered SNF stay does not apply to the SAR arm, so we are not expecting to see a 100 percent hospital admission rate during the baseline period.

Participants were far more likely to be female (75 percent) and white (68 percent). Overall, participants in the acute care arm were substantially less healthy and had a greater need for care than the general Medicare FFS population, as evidenced by the fact that the average HCC risk score for participants (2.9) was almost triple the average score for Medicare FFS beneficiaries nationwide (1.0).

Consistent with their high needs, participants had high rates of Medicare expenditures and service use in the year prior to enrollment. Table 3b shows baseline utilization and expenditure data for a common set of measures, including the four CMMI core measures. We examined the baseline costliness of care by calculating average PBPM Medicare payments in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $3,500, which is substantially higher than the 2014 national average of $792.[16] The average PBPM Medicare payment for inpatient care ($1,693) was the largest driver of the total cost of care, representing almost half of this cost (48 percent). Through its acute care arm, Mount Sinai intends to reduce the total costs to CMS by more than 50 percent for the 30-day episode of care (when compared with the 30-day cost of care for an individual with similar health problems who receives care through a traditional inpatient hospitalization).[17] If reductions in the costs for the 30-day episode of care are realized, then the awardee should see a similar decline in Medicare expenditures.

Participants in the acute care arm had high average utilization of expensive Medicare services before enrollment. More than half of the participants (68 percent) had an ED visit, resulting in an annual rate of outpatient ED visits of 1,574 per 1,000 participants during the baseline period. Fifty-seven percent of participants had a hospital admission in the baseline year, leading to an annual rate of acute hospital admissions of 1,247 per 1,000 participants. Similarly, the 30-day unplanned readmission rate for participants (26 percent) was much higher than the national rate of 18 percent per discharge. In addition, the annual rate of specialist visits (21,718 per 1,000 participants) was substantially higher than the rate of primary care visits (12,098 per 1,000 participants). These findings indicate that there may be a sizeable opportunity to reduce potentially avoidable admissions, ED visits, and readmissions during the intervention period by providing effective acute care services at home.

We observed an upward trend in average PBPM total payments in the last quarter before enrollment (approximately a 37 percent increase from the total PBPM average of quarters 1, 2, and 3). This is mainly a result of the increase in acute inpatient and outpatient care. We observed a similar pattern in the rates of hospital admissions, outpatient ED visits, and observation stays. These increases indicate that the beneficiaries targeted for the acute care arm are high-cost individuals who used acute care services extensively in the year before enrollment and, in particular, in the quarter that immediately preceded enrollment. We will take this trend into consideration when selecting a comparable cohort of Medicare FFS beneficiaries for the comparison group.

[16] The national data here and in the next paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

[17] The 50 percent reduction excludes the core MACT services that are paid for with HCIA R2 funds. This target is more easily measured than the estimated 20 percent run rate savings, which include the cost of the core MACT services.

Table 2a. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the SAR arm of the awardee's program through May 31, 2016

	All participants (N = 95)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	3	3
65 to 74	6	6
75 to 84	31	33
85 and older	55	58
Gender		
Female	59	62
Male	36	38
Race		
White	71	75
Black	14	15
American Indian, Alaska Native, Asian/Pacific Island American, or other	4	4
Hispanic	6	6
Original reason for Medicare eligibility		
Old age and survivor's insurance	81	85
Disability insurance benefits	13	14
End-stage renal disease (ESRD)[a]	1	1
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	21	22
HCC score[c]		Statistic
Mean		3.2
25th percentile		1.83
Median		2.8
75th percentile		4.48

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary began receiving services. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3a. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the SAR arm of the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	95	90	90	95	95
Average Medicare expenditures PBPM[a]					
Total	4,700 (552)	2,265 (572)	2,490 (466)	3,596 (928)	10,088 (937)
Acute inpatient	2,730 (360)	1,156 (328)	1,150 (325)	1,616 (597)	6,759 (721)
Inpatient other[b]	142 (62)	69 (68)	0 (0)	170 (166)	318 (161)
Outpatient[c]	280 (52)	160 (38)	265 (81)	373 (145)	318 (44)
Physician services	767 (70)	493 (64)	557 (85)	638 (82)	1,340 (122)
Home health	280 (48)	307 (409)	257 (61)	213 (52)	342 (60)
Skilled nursing facility	471 (169)	54 (50)	237 (127)	562 (281)	970 (272)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	29 (6)	26 (13)	25 (8)	24 (6)	41 (7)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	2,184 (310)	995 (280)	1,294 (394)	1,487 (449)	4,758 (307)
Outpatient ED visits	834 (153)	497 (166)	357 (136)	919 (236)	1,516 (262)
Observation stays	165 (44)	45 (45)	134 (111)	44 (43)	421 (127)
Primary care visits in any setting	13,026 (1,717)	6,965 (932)	8,833 (1,217)	9,668 (1,626)	25,853 (3,119)
Primary care visits in ambulatory settings	7,967 (1,128)	5,337 (663)	6,603 (790)	6,737 (854)	12,884 (1,979)
Specialist visits in any setting	28,718 (2,410)	21,120 (2,525)	20,567 (2,606)	25,503 (2,867)	45,853 (3,756)
Specialist visits in ambulatory settings	19,829 (1,762)	17,186 (2,152)	16,864 (1,985)	20,079 (1,973)	24,379 (2,382)

Table 3a *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	93 (3)	17 (4)	16 (4)	22 (4)	87 (3)
Percentage with an outpatient ED visit[e]	45 (5)	10 (3)	8 (3)	17 (4)	31 (5)
Percentage with an observation stay[f]	14 (4)	1 (1)	2 (2)	1 (1)	11 (3)
Percentage with a 30-day readmission among all discharges	39 (5)	25 (11)	52 (9)	43 (10)	29 (7)
Percentage of participants with a readmission among all participants	12 (3)	2 (2)	6 (2)	5 (2)	8 (3)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

Table 2b. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the acute care arm of awardee's program through May 31, 2016

	All participants (N = 71)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	6	8
65 to 74	12	17
75 to 84	22	31
85 and older	31	44
Gender		
Female	53	75
Male	18	25
Race		
White	48	68
Black	16	23
American Indian, Alaska Native, Asian/Pacific Island American, or other		
Hispanic	6	8
Original reason for Medicare eligibility		
Old age and survivor's insurance	58	82
Disability insurance benefits	12	17
ESRD[a]	1	1
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	20	28
HCC score[c]		Statistic
Mean		2.9
25th percentile		1.48
Median		2.52
75th percentile		3.69

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary began receiving services. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Table 3b. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the acute care arm of the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	71	67	67	70	71
Average Medicare expenditures PBPM[a]					
Total	3,500 (535)	2,516 (471)	3,342 (679)	3,594 (986)	4,304 (634)
Acute inpatient	1,693 (367)	1,034 (371)	1,545 (415)	1,775 (664)	2,198 (458)
Inpatient other[b]	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Outpatient[c]	352 (57)	271 (75)	244 (56)	300 (103)	579 (85)
Physician services	643 (71)	567 (112)	675 (91)	639 (101)	689 (80)
Home health	469 (71)	532 (110)	465 (100)	296 (75)	581 (103)
Skilled nursing facility	246 (97)	0 (0)	308 (157)	504 (243)	168 (100)
Hospice	39 (37)	87 (86)	72 (71)	0 (0)	0 (0)
Durable medical equipment	58 (17)	26 (7)	33 (9)	81 (43)	88 (33)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,247 (242)	670 (187)	1,232 (272)	1,112 (426)	1,816 (359)
Outpatient ED visits	1,574 (443)	975 (428)	1,786 (682)	527 (233)	2,951 (766)
Observation stays	460 (83)	0 (0)	123 (85)	234 (121)	1,419 (242)
Primary care visits in any setting	12,098 (1,614)	8,771 (1,129)	11,949 (1,824)	13,280 (3,019)	14,187 (1,877)
Primary care visits in ambulatory settings	8,536 (900)	7,187 (974)	8,623 (1,162)	9,068 (1,456)	9,193 (1,258)
Specialist visits in any setting	21,718 (1,917)	19,186 (2,566)	23,343 (4,349)	20,593 (3,021)	23,663 (2,406)
Specialist visits in ambulatory settings	17,249 (1,650)	16,201 (2,297)	18,477 (2,511)	15,737 (2,146)	18,556 (2,004)

Table 3b *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	57 (6)	17 (4)	26 (5)	16 (4)	35 (6)
Percentage with an outpatient ED visit[e]	68 (6)	12 (4)	18 (5)	10 (4)	49 (6)
Percentage with an observation stay[f]	39 (6)	0 (0)	3 (2)	6 (3)	34 (6)
Percentage with a 30-day readmission among all discharges	26 (5)	9 (9)	13 (9)	29 (10)	36 (10)
Percentage of participants with a readmission among all participants	15 (4)	2 (1)	3 (2)	4 (2)	9 (3)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Tables 4a and 4b: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4a. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Icahn School of Medicine at Mount Sinai (Acute)

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	105
Projected Medicaid population with 6 months of program exposure	218
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,220
Likelihood of all-cause hospitalizations	553
MDE sample size requirement to detect 20% effect	
Total expenditures	305
Likelihood of all-cause hospitalizations	138
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	No, low rate of identification of treatment group with claims data with significant dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Serious concern. We may be not able to identify a strong comparison group.
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	None

Table 4b. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Icahn School of Medicine at Mount Sinai (SAR)

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	140
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	969
Likelihood of all-cause hospitalizations	763
MDE sample size requirement to detect 20% effect	
Total expenditures	242
Likelihood of all-cause hospitalizations	191
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	No, low rate of identification of treatment group with claims data with significant dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Serious concern. We may be not able to identify a strong comparison group.
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	None

At this point, we do not plan to carry out a rigorous impact analysis of Mount Sinai's inpatient or SAR program. Projected enrollment in both programs is likely to be too low to detect effects of moderate or even substantial size. Moreover, selection into the programs is based on the assessment of clinical factors and of the nature of the patient's home environment. Thus, even if the treatment group were substantially larger in size, the selection of a valid comparison group would probably require additional primary data collection.

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V. NEXT STEPS

A. Implementation evaluation

As Mount Sinai enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We continue to have serious concerns about the viability of the originally proposed difference-in-differences evaluation methodology for this awardee. The eligibility criteria, in particular for the acute care arm, rely heavily on clinical assessments that cannot be replicated by using Medicare FFS enrollment and claims data, making it infeasible to construct a defensible comparison group. Moreover, the program's low enrollment would produces very low statistical power to detect effects. As a result, we will explore alternative evaluation designs and other data sources for assessing the effect of the MACT intervention

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on staff members' implementation experiences and on perceptions of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, social workers, paramedics, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, dentists, nurse-practitioners, and physician assistants. The survey will focus on the clinicians' implementation experiences and on their perceptions of program effects on provider behavior and patient outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experiences in the program and on their perceptions of its effect on the delivery of care and on health outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in May 2017.

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APPENDIX B.19.

CITY OF MESA FIRE AND MEDICAL DEPARTMENT

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MATHEMATICA Policy Research

REPORT

APPENDIX B.19

HCIA Round Two Evaluation: City of Mesa Fire and Medical Department

August, 2017

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Submitted to:

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CONTENTS

TABLES

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the City of Mesa Fire and Medical Department's Community Care Response Initiative (CCRI), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Mesa Fire and Medical Department's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also present the baseline characteristics of early treatment group beneficiaries based on an analysis of Medicare enrollment and fee-for-service (FFS) claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Mesa Fire and Medical Department made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the Mesa Fire and Medical Department addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Mesa Fire and Medical Department's Medicare FFS beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CCRI (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare FFS beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Mesa Fire and Medical Department has used funding from HCIA R2 to create the CCRI. The awardee is an emergency medical services (EMS) provider and the sole 911 dispatch operator for fire and medical emergencies in Mesa, Arizona. The awardee operates the CCRI in Mesa and neighboring Apache Junction, Arizona. The CCRI consists of the following service delivery components: (1) a primary 911 response component, which aims to divert low-risk 911 callers from the emergency department (ED), and (2) a secondary care transitions component for high-risk patients who were recently discharged from the hospital.

The awardee launched its primary 911 response component on December 1, 2014. The purpose is to divert low-risk 911 callers from EDs by dispatching mobile community medicine (CM) units to provide nonemergency services on the scene. The Mesa Fire and Medical Department offers three CM 200 series units, which are ambulances staffed with a captain paramedic and an advanced practice provider (APP), who provide services similar to those in an urgent care setting, such as sutures and administration of antibiotics. Mountain Vista Medical Center officially employs the APPs, but they work alongside paramedics in the fire department and report to battalion chiefs in the fire stations for operational issues. Three additional units, CM 2200 series units, are sports utility vehicles staffed with a captain paramedic and a licensed behavioral health clinician, who provide nonemergency behavioral health services related to anxiety, depression, substance abuse, and suicidal ideation. Crisis Preparation and Recovery Inc. (CPR) employs the behavioral health clinicians, who are located in the fire department and report to battalion chiefs. Throughout this report, we refer to CM 200 series units as "medical units" and CM 2200 series units as "behavioral health units."

To support its 911 response component, the Mesa Fire and Medical Department redesigned its 911 dispatch protocols to incorporate the new CM units. The Mesa Fire and Medical Department hired two triage nurses to support the operators who dispatch the CM units, and plans to hire another. After determining that a patient is not in need of emergency response, operators can dispatch a CM unit and transfer the call to triage nurses to collect more patient information for the CM unit already en route. Alternatively, operators can transfer nonemergency calls to triage nurses before dispatching a unit, in which case the triage nurses dispatch the appropriate response. Usually, triage nurses dispatch either a medical or behavioral health unit, but sometimes patients tell triage nurses new information that warrants an emergency response. Triage nurses can also help callers with very low-risk concerns resolve issues over the phone. The Mesa Fire and Medical Department also enlisted five physicians to provide centralized medical direction by phone to providers in the field who need assistance.

The awardee also launched a post-hospital care transitions component in November 2015 to provide home visits to individuals recently discharged from Mountain Vista Medical Center—with a focus on patients who have congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), sepsis, or pneumonia and plans to add other qualifying diagnoses. The goal of the post-hospital care transitions component is to reduce hospital readmissions among high-risk patients. The Mesa Fire and Medical Department is working with care managers in the hospital to identify and enroll eligible patients. As of June 2016, only about a dozen patients had received care transitions services. Initially, the awardee was working with its partners to define a care protocol for patients with CHF and ensure that CM units were properly outfitted. After

addressing those challenges, enrollment remained low because Mountain Vista Medical Center's care managers did not prioritize patient identification and enrollment. As of September 2016, the awardee reported that strategies to increase enrollment were showing early signs of success.

The Mesa Fire and Medical Department is currently billing for behavioral health services through its partner, CPR. The awardee is attempting to determine appropriate billing codes, set up a billing infrastructure, and negotiate with payers and providers to obtain reimbursement for its medical CM services.

The Mesa Fire and Medical Department aims to serve 16,200 individuals during the three-year cooperative agreement. By the end of the cooperative agreement, the awardee's goals are to (1) reduce low-risk patients' ED and ambulance use by 40 percent, (2) reduce high-risk patients' hospital readmissions, and (3) reduce spending by $41 million (Table 1). The awardee expects cost savings to derive from the 911 response component; the Mesa Fire and Medical Department has not developed cost savings goals for the care transition component.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Mesa Fire and Medical Department during the first year of its cooperative agreement.

- CM units actively responded to 911 calls from low-risk participants and successfully diverted about 70 percent of these callers from the ED.
- A synergistic partnership with local police emerged unexpectedly. Police valued assistance from the CM units with citizens in police custody seeking medical attention and with citizens who exhibited behavioral health conditions.

We also identified several initial challenges in implementing the program and the awardee's strategies for addressing them.

- It took longer than expected to launch the post-hospital care transitions component for high-risk patients. The Mesa Fire and Medical Department partnered with three organizations to implement this component: (1) IPC Healthcare, a hospitalist organization that provides clinician services to Mountain Vista Medical Center and other inpatient and post-acute settings; (2) Bridge to Care, an organization providing care transitions services to patients at Mountain Vista Medical Center; and (3) Aviant Healthcare, which offers an electronic platform that providers use to coordinate patient care. The awardee and its partners worked with the hospital's specialists to develop care protocols for participants with CHF and COPD, and outfitted CM units with the equipment necessary to adhere to those protocols. They also collaborated with the hospital's care managers to coordinate referrals and enroll patients into the program.
- Incorporating APPs and licensed behavioral health care providers into fire department protocols and culture was challenging, especially because those providers are not Mesa Fire and Medical Department employees. In response, the awardee appointed a deputy chief to manage CCRI operations, with such duties as defining protocols, handling scheduling, educating fire department staff, and addressing staff issues.

Finally, we identified several early lessons learned by the Mesa Fire and Medical Department in implementing its program.

- Effectively introducing an innovative 911 response requires consistent communication among all stakeholders, including Mesa Fire and Medical Department staff, participating providers, local partners, and the public.
- Effectively launching an innovative program for delivering care requires an incremental approach that demonstrates "proof of concept" through small trials before scaling up the intervention more broadly.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Mesa Fire and Medical Department made progress in the following areas:

- The Mesa Fire and Medical Department reached 56 percent of its three-year enrollment target.
- The CM teams continued to treat and refer low-risk 911 callers to help them avoid ambulance and ED use. They have diverted an estimated 69 percent of low-risk callers from the ED since program inception.
- Program staff implemented an electronic medical record (EMR) system to facilitate patient tracking and billing. They continued to work successfully with local police, although they needed to educate police on limiting their calls to low-risk patients for whom other community resources were not available.
- The awardee is currently billing payers for behavioral health services through its partner Crisis Preparation and Recovery. Awardee leaders also successfully negotiated payment agreements with one small payer for all low-risk CM patients. They are continuing negotiations with other payers and developing a fee structure to facilitate reimbursement.

Over the past year, the Mesa Fire and Medical Department also made several changes to its program:

- Added diagnostic tests and medications to the medical units
- Adapted the role of the triage nurses to enhance their involvement in the dispatch process and increase their call volume

Below we note the key challenges that the Mesa Fire and Medical Department has worked to address in the second year of its cooperative agreement.

- CM unit teams responding to low-risk 911 callers continued to cite patient refusal as a challenge. In response, teams began to document patient refusal and develop strategies for encouraging patients to accept on-site care. The awardee's public information official also launched a public outreach campaign.

- Enrollment in the care transition component continued to lag as the awardee tried to increase referrals from hospital providers and care managers. To address this challenge, the awardee placed a nurse-practitioner and captain paramedic in the hospital to facilitate enrollment in the care transitions component.

As the Mesa Fire and Medical Department enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The Mesa Fire and Medical Department is developing infrastructure to facilitate reimbursement, including a fee structure and a billing entity with a taxpayer identification number (TIN) that can be used to bill for CM services. Although this is new territory for the awardee, the Mesa Fire and Medical Department continues to make progress in negotiating payment from local payers and providers.

Table 1. Mesa Fire and Medical Department: CCRI characteristics at a glance

Program characteristic	Description
Purpose	The Mesa Fire and Medical Department is redesigning its 911 emergency response by dispatching CM units to low-risk callers and treating them on site in the community—often at home—rather than transporting them to the ED. CM units will also provide care transition services to patients with selected chronic conditions who were recently discharged from the hospital.
Components	• 911 response. Using CM units staffed with either an APP and a paramedic or a licensed behavioral health clinician and a paramedic to provide direct care to low-risk 911 callers. Two subcomponents support the 911 response: - Redesigning 911 dispatch protocols and incorporating a nurse triage specialist to better identify low-risk calls suitable for CM unit response - Providing centralized medical direction through facilitated physician consultation with APPs and triage nurses • Care transitions. Conducting home visits and care coordination for high-risk patients within 72 hours of hospital discharge
Target population	• Low-risk 911 callers • Patients with CHF, COPD, sepsis, and pneumonia who were recently discharged from Mountain Vista Medical Center and were identified as high-risk for readmission
Theory of change/theory of action	Mesa hypothesizes that (1) using CM units to treat low-risk participants on site in the community will reduce inappropriate use of ambulances to transport participants to the ED and (2) using CM units to provide higher-risk participants with care transition services in their homes after hospital discharge will reduce hospital readmissions. This approach will reduce ED overcrowding and help focus emergency services on priority patients, thus reducing costs and improving the quality of care.
Payment model	New fee-for-service (FFS) payment, shared savings
Award amount	$12,779,725
Launch date[a]	December 1, 2014
Setting	CM units dispatched from Mesa Fire and Medical Department stations to community settings and patients' homes
Market area	Urban, suburban
Market location	Mesa and Apache Junction, AZ
Outcomes	• Reduce low-risk patients' ED visits and ambulance use by 40 percent in three years • Reduce high-risk patients' hospital readmissions in three years (high-risk patients include those diagnosed with CHF, COPD, pneumonia, and sepsis; Mesa may add more diagnoses) • Reduce ambulance use and ED visits to save $41 million in three years

[a]After the initial planning period, the awardee's program began to operate as of this date.

APP = advanced practice provider; CHF = congestive heart failure; CM = community medicine; COPD = chronic obstructive pulmonary disease; ED = emergency department

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Mesa Fire and Medical Department in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 through June 30, 2016. For the analyses of the Mesa Fire and Medical Department's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Three program leaders at Mesa Fire and Medical Department
- A captain paramedic at Mesa Fire and Medical Department
- A nurse-practitioner at Mesa Fire and Medical Department
- A licensed behavioral health clinician at Mesa Fire and Medical Department
- A triage nurse at Mesa Fire and Medical Department
- A care coordination manager from IPC Healthcare who works at Mountain Vista Medical Center

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the implementation progress of the Mesa Fire and Medical

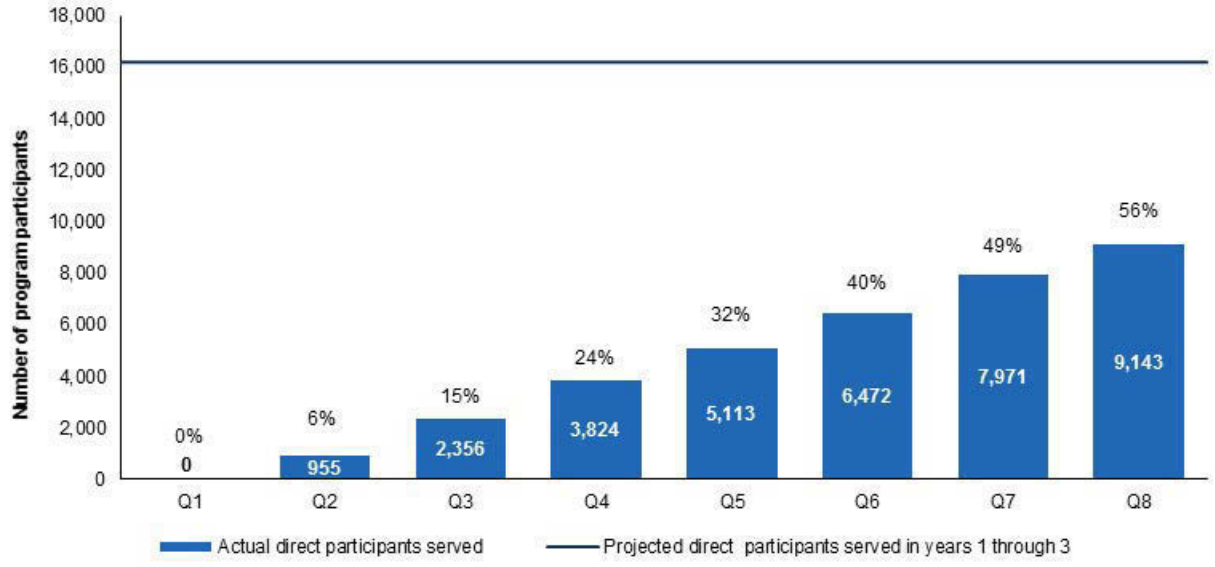
[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

Department during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Overall, the Mesa Fire and Medical Department reported to the implementation and monitoring contractor that it directly served 9,143 participants from December 2014 (the launch of the program) through August 2016, which represents about 56 percent of its 16,200 projected direct participants (Figure 1). Participants are considered enrolled in the 911 response service delivery component if a CM unit is dispatched to their location following a 911 call. Participants voluntarily enroll in the care transitions component during their hospital stays. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Mesa does not have indirect participants.

Mesa Fire and Medical Department's progress in meeting its three-year enrollment goal was influenced by several factors. In the fall of 2015, the awardee adjusted its projected enrollment down from 26,000 participants to 16,200 participants to reflect the average number of 911 response encounters completed during the first year of the cooperative agreement and projected enrollment in the care transitions component.

Case managers at the hospital were responsible for enrolling patients in the post-hospital care transitions component, but competing priorities among limited staff resulted in few referrals to the program. Awardee leaders also reported limited buy-in among case managers and other hospital staff because they work for the hospital, not the Mesa Fire and Medical Department. In response, the awardee assigned its lead nurse-practitioner and a captain paramedic to enroll participants at the hospital and to participate in daily morning meetings with hospital staff to help raise awareness in the hospital and increase referrals. The awardee also began identifying hospital case managers to serve as champions to facilitate buy-in and referrals from their peers. In the future, the Mesa Fire and Medical Department plans to develop a care coordination team, including a nurse-practitioner, social worker, and paramedic, to further increase enrollment in the post-hospital care transitions component.

B. Implementation of the service delivery model

Mesa Fire and Medical Department continues to implement its 911 response and post-hospital care transitions components, making small adaptations to its service delivery models. The awardee continues to successfully divert low-risk 911 callers from ambulance use and ED visits via its CM unit response. Between March 2015 and August 2016, the awardee reported that CM units helped 69 percent of low-risk 911 callers avoid taking an ambulance to the ED. (The awardee did not report diversions for participants enrolled between December 2014 and March 2015). The awardee also adapted triage nurse roles to enhance their involvement in the dispatch process and increase their call volume. However, the care transitions program has enrolled very few patients to date, resulting in limited opportunity to refine care delivery for participants recently discharged from the hospital.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of the CCRI program have been well received locally, and the awardee continues to refine the program to meet patients' needs. Mesa Fire and Medical Department staff see great value in their 911 response program

> "I didn't know how abused the system was until we've gone on a ton of calls. Then I can see why . . . this job is so important and why it's vital. Then I try to think about why wasn't this incorporated years and years ago. Why aren't these units in every city and every town across America?"
>
> — *Nurse-practitioner*

component; they feel their on-site medical and behavioral health care is better for patients experiencing low-risk medical or behavioral health concerns than emergency care. They recognize the potential to free up emergency response and ED resources and to reduce costs. Awardee leaders report there are now far fewer patients waiting in the ED to be transferred to an inpatient behavioral health care facility.

In spring 2016, the Mesa Fire and Medical Department added testing equipment and medications to CM medical units, allowing them to treat more low-risk patients on site. Specifically, medical units are now outfitted with handheld blood analyzers; urine analysis dipsticks; influenza and strep diagnostic tests; and medications to treat seizures, anxiety, nausea, and muscle spasms.

The awardee also continues to refine dispatch protocols and expand the role of triage nurses to ensure that the appropriate CM or emergency response units are dispatched. CM units are only dispatched if they are within a 15-minute drive of the caller, a new precaution to ensure that no caller waits more than 15 minutes for a response. The awardee also began using triage nurses to communicate with patients after dispatch to ensure that appropriate units—emergency response, medical, or behavioral units—arrive sooner. Triage nurses now collect additional information from callers after CM units are dispatched and share that information with CM staff en route. This helps prepare CM units for arrival, and sometimes reveals that an emergency response is more appropriate. Triage nurses also collect information from patients after operators dispatch emergency responders, which helps prepare the emergency response teams for the situation they will encounter upon arrival. In some cases, this allows the triage nurse to learn that a CM unit would be more appropriate to handle the situation. The Mesa Fire and Medical Department hired a second triage nurse to ensure availability seven days per week from 9:00 a.m. to 9:00 p.m. The awardee also plans to have the nurses call high-risk patients who were recently discharged from the hospital to schedule their follow-up visits, although that feature of the care transitions component had not begun as of June 2016. The program requires that follow-up visits occur within 72 hours of discharge from the hospital, preferably sooner.

2. Implementation processes

During the second program year, the awardee focused on resolving human resources challenges, implementing a new EMR system, understanding documentation challenges among behavioral health clinicians, and increasing enrollment into the care transitions component. In the first year of the award, the Mesa Fire and Medical Department faced challenges related to APPs and behavioral health providers who worked for partner entities. For example, it was unclear how providers could request time off or which entity could issue providers an email address. As a result, the awardee assumed responsibility for all human resources activities for all providers. This change aligned providers with fire department staff and also centralized management and oversight at the Mesa Fire and Medical Department. The awardee also needed to clarify the chain of command because APPs and behavioral health clinicians were initially reporting to the CCRI program director (not to battalion chiefs at implementing sites) and because the Mesa Fire and Medical Department did not directly employ the clinicians. Providers at all implementing sites now report directly to the battalion chiefs regarding operational issues, consistent with the Mesa Fire and Medical Department's chain of command.

In May 2016, the Mesa Fire and Medical Department implemented a new EMR system, Meditouch, to facilitate patient tracking and billing of medical claims. Previously, the awardee only used an encounter-based EMS tracking system that did not include patients' insurance information or support tracking patients over time. As of June 2016, clinical staff had been trained on Meditouch and were accessing it in the field on tablets. They reported having initial challenges adapting to the new system, such as loss of service in remote areas. Another challenge arose when APPs assessed patients and determined that they did need emergency transport to the ED. Providers were unsure if those patients should be documented in Meditouch, the EMS system, or both and whether they would be able to bill payers for assessing those patients even though they ultimately received an emergency response.

Calls resulting in dispatch of a behavioral unit follow a different documentation protocol, in which captain paramedics document the encounters in Meditouch and behavioral health providers document encounters in the CPR clinical record. Behavioral health documentation is more in-depth than for nonbehavioral encounters because clinicians are required to complete multipage assessments documenting their rationale for treatment decisions, such as petitioning patients to inpatient care against their will. Behavioral health staff then scan the handwritten assessments into CPR's EMR system and set up an electronic encounter record. Staff report that documentation is burdensome for behavioral health clinicians. In particular, it is challenging for them to complete all required documentation on shifts with above average call volume. The Mesa Fire and Medical Department is considering taking behavioral units out of service when they return to the station after a call to allow the clinicians time to complete the paperwork. Behavioral health staff report that they may receive between zero and six calls per shift; the most challenging shifts have more than four calls.

Despite challenges with enrolling patients in the care transitions program, the awardee made progress in developing the workflows and protocols for the post-hospital component. First, the awardee implemented the LACE[3] risk stratification tool to help hospital providers identify patients who are most appropriate for referral to the care transitions component. LACE enables providers to classify patients with targeted conditions as low, medium, or high risk. Medium-risk and high-risk patients are eligible for referral. The awardee also determined that IPC Healthcare staff would provide follow-up care for patients who transition to skilled nursing facilities (SNFs), while Mesa Fire and Medical Department teams would serve patients who transition home. The awardee and IPC Healthcare are also working together to develop protocols for patients who transition from SNFs to home, and for coordinating with patients' home health care providers. The Mesa Fire and Medical Department and IPC Healthcare also began working with staff at Mountain Vista Medical Center and local SNFs to facilitate handoffs at every transitional stage to ensure that patients are followed through the care continuum. For example, staff from Mesa Fire and Medical Department and IPC Healthcare are working with hospital and SNF providers to formalize a communication process for sharing patient information and communicating that the patient is enrolled in the awardee's care transitions program.

[3] LACE refers to the items on the tool: "L" stands for length of stay, "A" stands for acuity of admission, "C" stands for comorbidities, and "E" stands for number of emergency department visits in the last six months.

3. Organizational and external context

During the second program year, the awardee continued to refine its collaboration with local police, develop strategies to respond to patients who refuse service, and adapted the care transitions component to structural changes in the hospital. The Mesa Fire and Medical Department continues to have a mutually beneficial relationship with local police. Police request assistance from both medical and behavioral CM units on a regular basis, and unit teams sometimes find it helpful to have police present to help maintain safety. Behavioral health staff said that the program has increased community awareness about the importance of prehospital behavioral health care, especially among local police.

> "We have a great relationship with [local police] on scene with our behavioral units. On the medical side . . . it's a constant communication with [the police] because they really want to utilize these units appropriately, but the officers are not versed in medical care. It's a constant communication."
>
> *— Program leader*

However, the relationship with Mesa police has also presented some minor challenges. Some staff were concerned that police were circumventing dispatch protocols by calling 911 specifically to request a CM unit. Mesa Fire and Medical Department staff also expressed some concern that police were overusing the CM units, such as requesting that units come to jails to medically clear people who were recently arrested.[4] Awardee leaders reported that police calls requesting medical clearance at jails tripled in 2016. They are working to educate police about when it is appropriate to request the CM units and when to find other community personnel who may be more appropriate to provide medical clearance, such as medical personnel at the county jail.

One challenge that CM unit teams commonly cite is patient refusal of services. If the patient refuses service, paramedics, APPs, and behavioral health clinicians must request an ambulance to take them to the hospital. From June 2015 through May 2016, the awardee reported that 103 out of 5,121 patients refused service, which accounted for about 2 percent of all CM participants and about 7 percent of the patients who were transported to the ED. Staff reported feeling frustrated when people who clearly did not need emergency care insisted upon going to the ED. Staff reported that patients may refuse CM care because they do not believe that they will receive care that is of equally high quality as in the ED or because they want to visit the ED for nonmedical reasons, such as for food or shelter. In some cases, staff can successfully convert refusals by explaining that participants would receive the same care at the ED as they would from the CM unit. Teams also began documenting patient refusal as one of the barriers to care. Another way the awardee is hoping to reduce patient refusals is via a public outreach campaign to build community awareness. The awardee's public information officer has developed posters and table toppers to educate the public about the Mesa Fire and Medical Department's services. The materials were placed in malls and other public locations. The awardee has also developed news briefs and spoken at Child Support Services, community health fairs, schools, and immunization clinics about the program.

[4] Police must medically clear citizens before jail, especially patients who exhibit signs of intoxication or who request medical attention.

During the second year of the cooperative agreement, two partners in the care transitions component left the program. Bridge to Care, a care transitions company previously working in Mountain Vista Medical Center, and Aviant Healthcare, which offered an electronic platform that providers could use to coordinate patient care, both left the hospital. Since the care transitions program had not fully launched, these departures were not extremely disruptive, but the awardee did have to modify and streamline its approach.

C. Development of the payment model

The Mesa Fire and Medical Department continues to work with its partners, local health care facilities, and payers to develop a payment model. The awardee has been billing payers for behavioral health services using CPR's billing infrastructure since about October 2015, but does not bill patients for uncompensated care. Any money received from payers for behavioral health services is added to CCRI program funds. However, the awardee cannot similarly use Mountain Vista Medical Center's infrastructure to bill payers for medical services because there are no Current Procedural Terminology (CPT) codes for community medicine. The awardee is working with local Medicaid payers to develop a fee structure based on market and service data.

The awardee has no existing infrastructure to bill payers for medical services; the city contracts with a private ambulance company that bills payers for transportation to the ED. The Mesa Fire and Medical Department is unable to use its existing TIN to bill for medical CM services because the TIN is already designated for emergency services. The awardee similarly cannot use Mountain Vista Medical Center's TIN because services are not provided in the hospital. To address this challenge, the awardee is working with its partner, Intermedix, to set up a separate entity to bill payers for CM medical unit 911 response services and post-hospital care transition services.

The awardee has had some success negotiating with payers to execute a fee-for-service agreement with a small payer who will compensate the awardee less than the cost of service. The awardee accepted this arrangement as a starting point, but hopes to negotiate higher payments in the future. The awardee is also working with the payer to get the Mesa Fire and Medical Department added to its preferred provider network. A local Medicaid payer also provided the Mesa Fire and Medical Department with a lump sum investment as part of a shared savings agreement, with the goal of reducing behavioral health–related ED visits. The Mesa Fire and Medical Department has also begun sharing data with a commercial payer as a precursor to a payment arrangement. Another commercial payer indicated that it would like the Mesa Fire and Medical Department's assistance with managing patients who receive the most care. One obstacle to negotiating with payers is that Mesa is a relatively small market area; payers are more likely to get involved if Phoenix, Arizona, begins providing similar services.

In addition to payer negotiations, the awardee is in discussions with local providers to set up shared savings or other agreements. A representative at a local hospital and urgent care system expressed interest in the care transitions component, recognizing the potential for savings related to avoiding readmissions penalties. Program leaders think that they will have more success securing payment agreements for the care transitions component when they have more data to demonstrate potential savings. Program leaders are also in the early stages of working with large physician groups that participate in Medicare managed care programs. The awardee is working

to flag patients in these managed care programs to facilitate care coordination with patients' care managers following 911 calls and hospital discharge.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

The Mesa Fire and Medical Department's CCRI treatment group consists of two different groups of beneficiaries. The first group are beneficiaries who call 911, are screened as low acuity, and then receive medical care from a mobile health unit rather than from an emergency response team that would otherwise transport the caller to an ED by ambulance. The decision to send the mobile health unit rather than an ambulance is made by the 911 operator, with the help of a computerized decision tree. The mobile unit staff evaluate the caller; treat him or her if necessary; and direct the caller to further, appropriate care—also as necessary. For callers with behavioral health problems, a behavioral health counselor in the mobile health unit evaluates and directs callers to appropriate care. The awardee considers an individual encounter to be a success when a low-acuity patient is not transported by ambulance to the ED.

The Mesa Fire and Medical Department's CCRI has a separate program component to serve patients recently discharged from a hospital with congestive heart failure (CHF), with the goal of reducing readmissions among high-risk patients. In collaboration with a hospital (Mountain Vista Medical Center) and a transitional care organization, the awardee will dispatch mobile community care units to provide transitional care services, such as medication reconciliation and home risk assessments, to eligible patients within 72 hours of a hospital discharge. Beneficiaries in this component of the intervention comprise the second set of the treatment group.

A. Baseline characteristics of the treatment group

For the purposes of presenting baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were seen by the mobile health unit before May 31, 2016. We used the individual's first encounter with the mobile health unit in this period to trigger each person's baseline year. These beneficiaries had to be enrolled in Medicare fee-for-service (FFS), both Parts A and B, for at least 90 days in the baseline year (the 365 days immediately before their enrollment). We also had to be able to link them to Medicare claims and enrollment data. The calendar period covered by the baseline quarters is based on the enrollment date for each enrollee and therefore varies by enrollee. After we excluded beneficiaries who did not meet the above criteria, a total of 629 participants were included in the analysis of baseline characteristics for this report.[5]

Table 2 shows the demographic and health status characteristics of callers who are Medicare FFS beneficiaries. A sizeable proportion of this group is younger than 65 (29 percent), which indicates that the treatment group of Medicare FFS beneficiaries is relatively young compared with the broader Medicare population. Most participants are white (89 percent), with slightly more females (55 percent) than males (45 percent) in the sample. The majority of participants originally qualified for Medicare because of their age (59 percent). Nearly one-third (30 percent) of the beneficiaries are dually eligible for Medicare and Medicaid, compared with 18 percent in the general Medicare FFS population—although, in some cases Medicaid benefits may be

[5] A beneficiary may have had multiple encounters with the mobile health units after the program was launched. The awardee regards the encounters as separate cases in its participation counts. However, for the purpose of producing baseline characteristics, we considered only unique beneficiaries seen by a mobile health unit in the post-period.

restricted to the payment of co-insurance and deductibles. The average hierarchical condition category (HCC) risk score of participants is 2.24—more than double the average for Medicare FFS beneficiaries nationwide (1.0). Although participants with very high HCC scores are driving up the average in the sample, more than half of these participants have HCC risk scores that are higher than the national average. In addition, although the treatment population grows with each quarter, the baseline demographic characteristics are remarkably similar across the three quarters that we have analyzed—which suggests that the Mesa Fire and Medical Department's intervention benefits a specific type of Medicare FFS beneficiary. Participants in the Mesa Fire and Medical Department's CCRI have substantially poorer health status and a greater need for care than most Medicare FFS beneficiaries.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 629)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	184	29
65 to 74	180	29
75 to 84	145	23
85 and older	120	19
Gender		
Female	344	55
Male	285	45
Race		
White	559	89
Black	27	4
American Indian, Alaska Native, Asian/Pacific Island American, or other	23	4
Hispanic	17	3
Original reason for Medicare eligibility		
Old age and survivor's insurance	370	59
Disability insurance benefits	240	38
End-stage renal disease (ESRD)[a]	19	3
Hospice[b]	12	2
Medicare/Medicaid dual status, percent dual[b]	186	30
HCC score[c]		Statistic
Mean		2.24
25th percentile		0.85
Median		1.55
75th percentile		3.08

Table 2 *(continued)*

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which an individual was seen by a physician extender or treated in a mobile community medical unit. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Consistent with their poor health status, program participants had high rates of Medicare expenditures and service use in the year prior to enrollment—particularly in the two quarters immediately prior to participation. In Table 3, we report baseline utilization and expenditure data for a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation (CMMI). By avoiding costly ED use among low-acuity beneficiaries and connecting them to appropriate care, the Mesa Fire and Medical Department expects to reduce expenditures and ED utilization compared with what would have taken place absent its program. We examined baseline expenditures by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $2,549. Average PBPM Medicare payments for inpatient care ($916), physician services ($619), and outpatient care ($331) were the largest drivers of payments—representing three-quarters of the total cost of care. Growth in expenditures beginning in the last two baseline quarters, particularly for inpatient care and physician services, appears to be an important factor in the higher total average PBPM Medicare expenditures in the period before enrollment.

Because the CCRI focuses on reducing ambulance transports to the ED, we also examined average PBPM Medicare payments on ambulance transports in the baseline period. We measured expenditures for (1) all ambulance transports and (2) ambulance transports most likely to be associated with a 911 call. Ambulance transports are identified in the claims data according to place of service. To identify the transports most likely to be associated with 911 calls, we received guidance from the Mesa Fire and Medical Department to focus on transports for which the final destination was a hospital and whose origin was (1) the caller's residence; (2) the scene of an accident or an acute event; or (3) a residential, domiciliary, or custodial facility such as a nursing home. Because the CCRI focuses on low-acuity individuals who call 911, we can expect the program to have the strongest effects on ambulance transports associated with these calls. Table 3 shows that the average PBPM Medicare payments on all ambulance transports were $46 in the baseline year and $36 for transports most likely to be associated with 911 calls. Expenditures for ambulance use increased across the baseline quarters. The highest PBPM Medicare payments occurred in the quarter immediately before participation (a mean of $60 in the fourth quarter).

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	629	577	599	627	629
Average Medicare expenditures PBPM[a]					
Total	2,549 (153)	2,177 (192)	2,279 (206)	2,568 (220)	3,105 (244)
Acute inpatient	916 (81)	741 (101)	799 (123)	951 (135)	1,149 (126)
Inpatient other[b]	307 (47)	254 (80)	184 (51)	362 (74)	415 (97)
Outpatient[c]	331 (27)	339 (40)	307 (36)	295 (27)	376 (32)
Physician services	619 (31)	527 (34)	574 (43)	612 (40)	750 (47)
Home health	122 (11)	93 (15)	103 (15)	129 (15)	161 (19)
Skilled nursing facility	185 (23)	164 (39)	251 (51)	162 (34)	165 (32)
Hospice	39 (15)	29 (15)	35 (15)	22 (11)	60 (18)
Durable medical equipment	30 (4)	30 (6)	26 (3)	34 (9)	30 (5)
Ambulance use (all transports)	46 (4)	34 (5)	41 (6)	46 (6)	60 (6)
Ambulance use likely associated with a 911 call	36 (4)	29 (4)	30 (5)	33 (4)	50 (6)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	975 (70)	791 (87)	826 (99)	999 (103)	1,231 (111)
Outpatient ED visits	2,158 (193)	1,729 (207)	1,796 (216)	1,927 (222)	3,113 (271)
Observation stays	339 (32)	315 (50)	225 (54)	346 (53)	459 (63)
Primary care visits in any setting	12,622 (605)	11,361 (688)	11,224 (767)	12,188 (752)	15,470 (1,092)
Primary care visits in ambulatory settings	7,815 (341)	7,539 (415)	7,530 (469)	7,753 (460)	8,370 (439)
Specialist visits in any setting	21,023 (988)	18,599 (1,246)	19,765 (1,318)	19,798 (1,158)	25,428 (1,563)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Specialist visits in ambulatory settings	11,060 (413)	10,815 (512)	10,719 (543)	10,719 (479)	11,808 (500)
Ambulance use (all transports)	1,519 (147)	1,204 (163)	1,297 (175)	1,476 (166)	2,054 (217)
Ambulance use likely associated with a 911 call	1,237 (131)	994 (144)	1,038 (162)	1,137 (138)	1,742 (195)
Measures of any health care utilization					
Percentage with a hospital admission[d]	43 (2)	15 (1)	14 (1)	18 (2)	22 (2)
Percentage with an outpatient ED visit[e]	58 (2)	22 (2)	22 (2)	25 (2)	34 (2)
Percentage with an observation stay[f]	24 (2)	7 (1)	5 (1)	8 (1)	10 (1)
Percentage with a 30-day readmission among all discharges	25 (2)	18 (4)	27 (4)	25 (4)	28 (4)
Percentage of participants with a readmission among all participants	11 (1)	3 (1)	4 (1)	4 (1)	4 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

As with expenditures, the average utilization of expensive Medicare services before enrollment was high, particularly in the last quarter before enrollment. The annual rate of acute care hospitalizations was 975 per 1,000 participants during the baseline year, with a rate of 1,231 per 1,000 beneficiaries during the last quarter. This compares to a national rate of 283 per 1,000 Medicare FFS beneficiaries in 2013. At baseline, participants had a high number of ED visits that did not lead to a hospitalization, at an annual rate of 2,158 visits per 1,000 participants in the baseline year, compared with the national rate of 445 per 1,000 Medicare beneficiaries in 2013. The highest rate was in the quarter immediately before participation, when there were 3,113 visits per 1,000 participants. At 58 percent, the likelihood of an ED visit in the baseline period was very high. Similarly, the 30-day unplanned readmission rate for participants was 25 percent per discharge—higher than the national rate of 18 percent per discharge. Because participants had high rates of acute care utilization, there may be a sizeable opportunity to reduce potentially avoidable admissions, ED visits, and readmissions during the post-period through the effective deployment of the mobile health units and by connecting beneficiaries with other forms of outpatient care. At the same time, Table 3 also shows that participants had high rates of primary care utilization (7,815 primary care visits in ambulatory settings per 1,000 beneficiaries per year) and specialty care utilization (11,060 specialist visits in ambulatory settings per 1,000 beneficiaries per year).

We also examined the two measures of ambulance transport utilization. Over the baseline year, there were 1,237 ambulance transports per 1,000 beneficiaries that were likely associated with 911 calls and 1,519 overall ambulance transports per 1,000 beneficiaries. These rates were driven by much higher ambulance use in the last quarter before enrollment when there were 1,742 ambulance transports per 1,000 beneficiaries that were likely to be associated with 911 calls and 2,054 total ambulance transports per 1,000 beneficiaries.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Mesa Fire and Medical Department

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	944
Projected Medicaid population with 6 months of program exposure	2,180
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,671
Likelihood of all-cause hospitalizations	972
MDE sample size requirement to detect 20% effect	
Total expenditures	418
Likelihood of all-cause hospitalizations	243
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff, clinician, and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact evaluation of the awardee's program by using difference-in-differences estimation with propensity score matched comparison groups for Medicare and Medicaid beneficiaries. There are two different groups targeted by the CCRI. The first is low-risk 911 callers with targeted conditions, including acute illnesses such as colds and flus, mental disorders or behavioral health issues, substance abuse disorders, and health-related behaviors such as stress management and medication adherence. The second component of the initiative targets high-risk patients with CHF or COPD who were recently discharged from Mountain Vista Medical Center. Although both program components deploy mobile community medicine units to participants' homes, the services differ based on needs, particularly on whether the participant is a low-risk 911 caller or a high-risk patient recently discharged from the hospital. As such, the CCRI consists of two separate program components, which will be evaluated separately in the impact evaluation. Based on current enrollment trends, we expect to have a sufficient sample size to analyze the low-risk 911 caller component but not the high-risk component. In our evaluation, we will choose comparison group communities that have similar demographics, medical care services, and socioeconomic characteristics as Mesa, Arizona, where the awardee operates. We will then use propensity score matching of patients from these

communities to the treated program participants in Mesa in order to derive comparison groups that are similar in terms of medical, payer, and demographic information. We have sufficient participation by Medicare and Medicaid beneficiaries to detect a 20 percent effect or smaller on Medicare and Medicaid expenditures.

V. NEXT STEPS

A. Implementation evaluation

As the Mesa Fire and Medical Department enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact evaluation will be to identify a geographic area or areas comparable in demographics, medical care services, and socioeconomic characteristics to the Mesa catchment area and determine the feasibility of drawing comparison groups for two distinct intervention groups: (1) low-acuity 911 callers and (2) high-risk patients (that is, those with CHF) who were discharged from Mountain View Medical Center. We will focus our initial efforts on drawing two comparison groups of Medicare FFS beneficiaries. A major challenge in drawing the comparison groups will be in our ability to replicate the inclusion criteria for the low-acuity 911 callers in the pre-intervention period because our estimation strategy will use a difference-in-differences repeat cross-sections model. We will match the treatment and comparison groups on baseline characteristics and ensure that the two sets of characteristics are sufficiently balanced across the two groups. We will then produce tables for the groups, showing descriptive statistics before and after matching. Next, we will create outcome and explanatory variables and produce initial impact estimates. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, social workers, and paramedics. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.20.

MONTEFIORE MEDICAL CENTER

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REPORT

FAPPENDIX B.20

HCIA Round Two Evaluation: Montefiore Medical Center

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Montefiore Medical Center's Behavioral Health Integration Program (BHIP), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Montefiore Medical Center's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our descriptive analysis of Medicare and Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Montefiore Medical Center made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Montefiore Medical Center and its implementing sites addressed the issues identified during the first program year? What factors have influenced the awardee's and its sites' ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Montefiore Medical Center's Medicare beneficiaries and Medicaid enrollees, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of Montefiore Medical Center's BHIP (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries and Medicaid enrollees (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Montefiore Medical Center, a large tertiary care center in the Bronx, New York, is using its HCIA R2 funds to implement the BHIP in a subset of its 22 primary care sites (key program characteristics are noted in Table 1). Montefiore Medical Center rolled out the BHIP in two phases. The first phase was launched in February 2015, when three sites began to implement the program. The second phase started in August 2015, when four additional sites began to implement the program. The awardee has since reduced its phase 2 cohort to three sites (described in detail below). It expects the BHIP to reach 4,500 individuals who receive services from participating primary care sites and who have depression, anxiety, or (for children and adolescents) attention deficit hyperactivity disorder (ADHD).[2]

Montefiore Medical Center's BHIP centers on the collaborative care model, a measurement-based model in which behavioral health care is integrated into primary care settings.[3] Under this model, all patients who visit the BHIP's primary care practices complete a self-administered screening tool in which they identify behavioral health symptoms. Primary care providers connect individuals who screen positive for one of the program's targeted conditions to a member of the site's behavioral health team (behavioral health patient educators, licensed clinical social workers, and—for children and adolescents—clinical psychologists). Each site also has a psychiatrist who consults with (1) the primary care providers to support the management of participants' psychiatric medication and (2) the behavioral health team to help identify participants' needs for behavioral health services. Participants may take advantage of any combination of the following: short-term psychotherapy with the licensed clinical social worker, psychiatric medication management with the psychiatrist, or telephone outreach from the behavioral health patient educator. These staff monitor behavioral health measures and support the participants' efforts to achieve their behavioral health goals.

The behavioral health team conducts follow-up behavioral health screening to monitor participants' progress throughout the program. The screening targets depression, anxiety, or alcohol use based on the symptoms identified in the participants' response to the initial screening tool. The behavioral health team also uses a patient registry, developed by the University of Washington, to collect and track the patient's scores from the screenings, track follow-up communication, and other related information. Participants whose screening scores do not improve during the program are connected by the patient educator or social worker to the consulting psychiatrist for further assessment and recommendations for next steps in treatment.

The BHIP also incorporates telemedicine tools to boost the participants' responsiveness to the program. During the second year of the program, BHIP staff deployed an interactive voice response technology that allows participants to complete follow-up screenings via their phone, as well as receive appointment reminders and health education materials. BHIP staff also rolled out

[2] This report is based on data submitted by Montefiore Medical Center to the implementation and monitoring contractor. However, in subsequent communication, the awardee reported that it plans to enroll and serve at least 4,725 direct participants. The awardee also reported that it plans to provide services to 4,725 indirect participants.

[3] University of Washington, Advancing Integrated Mental Health Solutions. "Collaborative Care." Available at https://aims.uw.edu/collaborative-care.

a smartphone application that provides participants with follow-up screenings; educational materials and videos; and reminders about treatment goals, appointments, and medications. The application also has a chat feature that allows participants to communicate with patient educators. In addition, social workers use a text messaging platform to receive and respond to messages from participants. Unlike the patient registry and other telemedicine tools, the text messaging platform is available to social workers throughout all of the awardee's primary care practices.

To sustain the program after the cooperative agreement ends, Montefiore Medical Center plans to develop a monthly contact capitation model instead of the initially planned case-based payment model. The awardee also plans to develop pay-for-performance incentives for participating primary care providers and expects to virtually test the payment model at one implementing site during the third year of the program.

By the end of the three-year cooperative agreement, Montefiore Medical Center intends to have achieved three goals:

- Increase participants' satisfaction with care
- Improve participants' behavioral health and chronic disease outcomes
- Realize a net savings in the cost of care for its patient population through fewer hospitalizations and emergency department (ED) visits

The awardee hypothesizes that these goals will be achieved as primary care providers and behavioral health staff work together on site to measure and respond to participants' progress, allowing them to better address the participants' behavioral health needs.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Montefiore Medical Center during the first year of its cooperative agreement.

- The awardee launched the BHIP at seven primary care practices and met its Year 1 enrollment target of 1,285 participants.
- Montefiore Medical Center contracted with the University of Washington to use its patient registry and to conduct training webinars to support program implementation. The awardee also executed data use agreements with two of the three health plans it expects to partner with as it develops a payment model to sustain the program after the cooperative agreement ends.
- Despite initial hiring delays resulting from new administrative procedures, the awardee managed to hire all BHIP administrative and frontline staff during the first year of the program. In addition to training webinars provided by University of Washington faculty, BHIP staff received ongoing monthly training from program leaders.

We also identified several initial challenges in implementing the program and Montefiore Medical Center's strategies for addressing them.

- A new electronic medical record (EMR) system rolled out at all primary care practices in May 2015 presented barriers to implementation. The training and learning period for the system took a significant amount of the staff's time. In addition, providers at the sites saw fewer patients during the transition, limiting the opportunities for program screening and enrollment. BHIP leaders did, however, developed strategies to keep enrollment at a sufficient level by, for example, stationing the behavioral health patient educator in the waiting area to ensure that patients completed the behavioral health screening tool. Program leaders also worked with site staff to re-educate the primary care staff on the program after the EMR rollout to ensure that the program remained a priority.
- Although primary care providers strongly support the BHIP, many reported that limited time and competing priorities restricted their engagement with the behavioral health team. BHIP site staff mitigated this issue by adapting their communication and engagement strategies to meet the needs and schedules of individual primary care providers in each site.
- According to program staff, keeping participants engaged in the BHIP was a challenge because of language and literacy barriers, the stigma surrounding mental health treatment, and socioeconomic barriers such as poor access to transportation. Montefiore Medical Center is attempting to reduce these barriers by offering screening and treatment in the participants' language when possible, promoting behavioral health care to participants as part of their overall health care, and connecting participants to the community resources they need.

Finally, we identified several early lessons learned by Montefiore Medical Center in implementing its program.

- The program and the site leaders' clear vision for the BHIP as well as their hands-on guidance helped frontline staff to implement the program as intended.
- Frontline staff noted that collaboration, teamwork, and trust are key elements that generate buy-in and contribute to the program's success.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Montefiore Medical Center made progress in the following areas:

- Montefiore Medical Center continued to meet its projections for direct and indirect participant enrollment. The program served 3,974 direct participants and 4,002 indirect participants as of August 31, 2016.
- In addition to continuing to support the implementation of the integrated care model at its phase 1 and phase 2 primary care sites, Montefiore Medical Center rolled out new telemedicine tools.
- The awardee finalized an agreement with its third health plan partner and continued to work with these partners to refine plans for a payment model.

Over the past year, Montefiore Medical Center also made changes to its program and to its proposed payment model:

- The awardee reduced the number of implementing sites from seven to six because of enrollment and staffing challenges at some sites.
- The awardee also shifted its focus from a case-based payment model to a monthly contact capitation-based model.

Below we note the key challenges that Montefiore Medical Center has worked to address in the second year of its cooperative agreement.

- Behavioral health staff at all implementing sites continued to struggle with the need to document services in both the program's patient registry and in Montefiore Medical Center's EMR because of the lack of interoperability between the two systems. Program leaders plan to integrate patient registry fields into the EMR system to reduce the burden of documentation on the staff.
- Staff at some phase 2 implementing sites were initially reluctant to engage in the program, in part because these sites had limited experience with integrated care models. BHIP leaders used examples from the first phase of implementation to generate staff buy-in and provided significant hands-on support and coaching to help staff adapt the program model to their setting.
- Changes in senior leadership within Montefiore Medical Center spawned new initiatives that competed with the program for the frontline staff's time and attention. BHIP leaders reached out to the new leaders to ensure that the program remained a priority and worked with program staff to adapt each site's workflow as needed.
- Participants' mental health and social support needs continued to present barriers to their engagement in the program. Several aspects of the program model, such as the behavioral health patient educator and supportive technologies, helped the staff to address this challenge.

As Montefiore Medical Center enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee hopes to virtually test its monthly contact capitation model and pay-for-performance incentives at one implementing site during the third year of the program.
- The awardee also anticipates that the proposed payment plan will align well not only with similar efforts by the federal government and New York State to reimburse providers for collaborative care, but also with payers' preferences for a single, all-inclusive rate for collaborative care.

Table 1. Montefiore Medical Center: BHIP characteristics at a glance

Program characteristic	Description
Purpose	Montefiore, a large tertiary care center in the Bronx, NY, is implementing the BHIP to provide behavioral health screening and treatment to eligible patients in 6 of its 22 primary care sites
Components	• Integrated behavioral health and primary care services • Patient registry to collect data on participants and monitor their progress • Telemedicine tools to administer follow-up screenings, engage, and communicate with participants
Target population	4,500 individuals who receive services from participating primary care sites and screen positive for depression, anxiety, or (for children and adolescents) ADHD
Theory of change/theory of action	The awardee hypothesizes that primary care providers who work with on-site behavioral health staff to measure and respond to the participants' progress will be better able to address their behavioral health needs. This improved access to behavioral health, integrated with primary care services, will lead to increased satisfaction with care, better physical and behavioral health outcomes, fewer hospitalizations, and lower costs.
Payment model	Value-based payments, monthly contact capitation payment for care management/coordination services
Award amount	$5,583,090
Launch date[a]	2/9/2015
Setting	Six primary care practices and a virtual environment via telemedicine tools
Market area	Urban
Market location	The Bronx, NY
Outcomes	• Increase in patient satisfaction • Improvement in participants' behavioral health and chronic disease outcomes • Net savings in cost of care for patient population through fewer hospitalizations and ED visits

[a]After the initial planning period, the awardee's program began to operate as of this date.

ADHD = attention deficit hyperactivity disorder; BHIP = Behavioral Health Integration Program; ED = emergency department

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Montefiore Medical Center in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 25th through August 19th, 2016. For the analyses of Montefiore Medical Center's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Two BHIP leaders
- Four licensed clinical social workers
- Four patient educators
- Two consulting psychiatrists
- Two primary care providers

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It provides a conceptual framework that can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

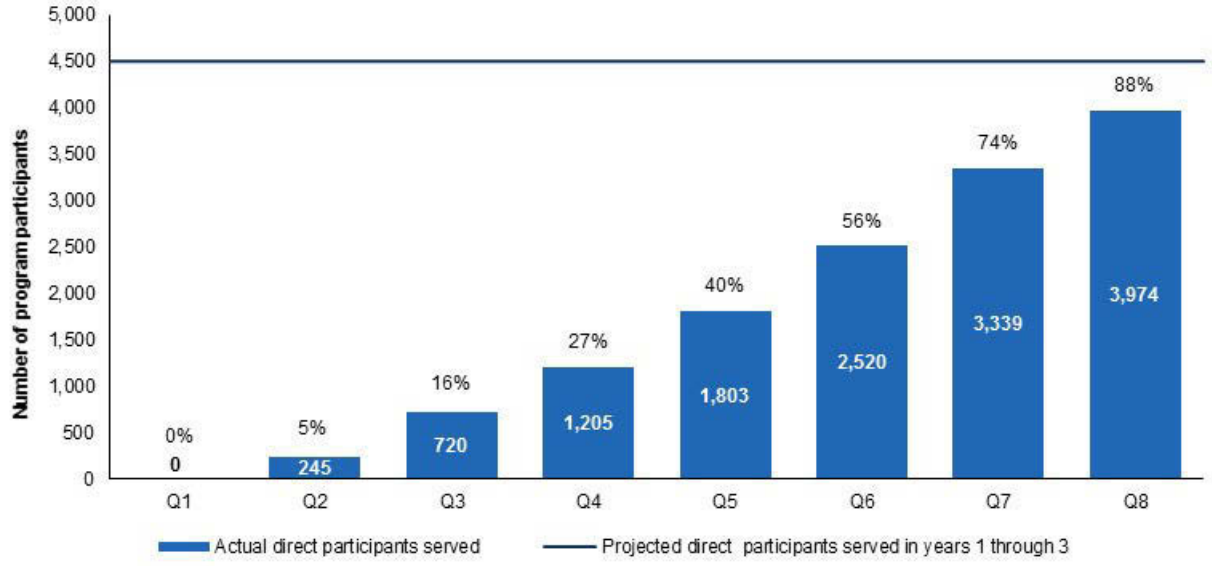
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Montefiore Medical Center's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[4] Dam Schroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Montefiore Medical Center reported to the implementation and monitoring contractor that it directly served 3,974 participants from February 2015 (the launch of its program) through August 2016, which represents about 88 percent of its 4,500 projected direct participants (Figure 1). Montefiore Medical Center also reported that it indirectly served 4,002 participants from February 2015 through August 2016, which represents about 87 percent of its 4,575 projected indirect participants (Figure 2). The baseline characteristics of participants whom we were able to identify in Medicare and Medicaid fee-for-service enrollment and claims data are presented in Section IV.

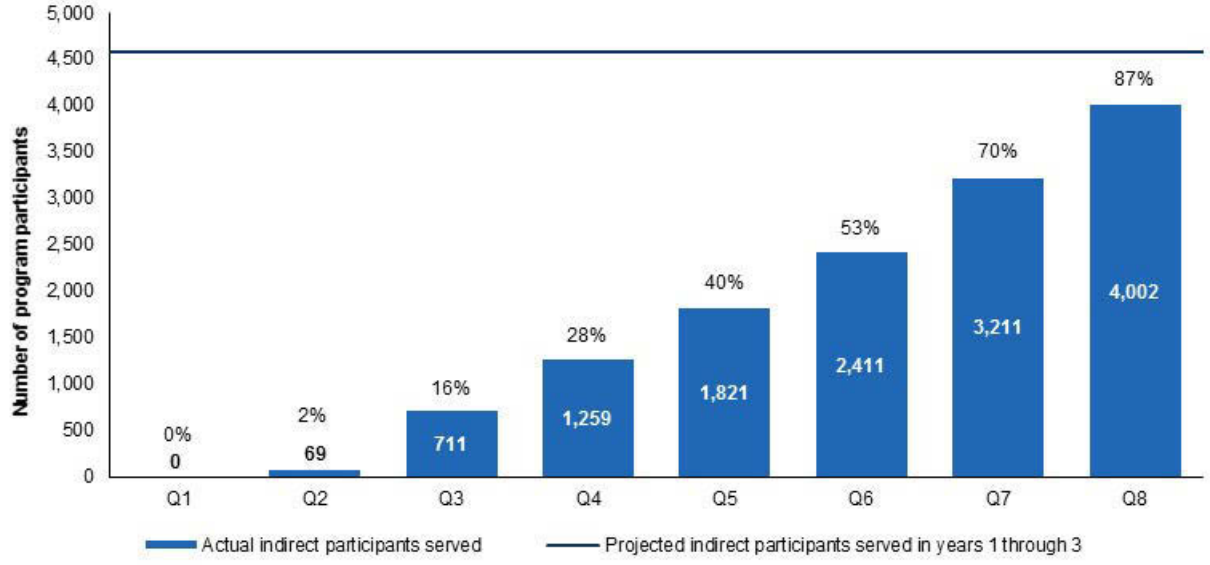
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter.

Montefiore defines indirect participants as patients who receive care from staff who are trained in the program but not funded by HCIA R2. Montefiore estimates the number of indirect participants because it is unable to track this information in its electronic medical record or patient registry.

The awardee is on track to meet its three-year enrollment target. Respondents at most sites noted that the program's passive enrollment strategy and the participants' strong need for behavioral health care facilitated enrollment, as the program is designed to engage and support all participants who screen positive for behavioral health conditions. Respondents at some sites also noted that support for the program from staff in the front office also facilitated enrollment. These staff are responsible for distributing initial screening tools to patients in the waiting areas.

Although nearly all sites made steady progress toward the enrollment goal program leaders reported that one phase 2 site struggled to identify potential participants. At this site, it was expected that more participants would score positive on the behavioral health screenings. In addition, staff found it difficult to interest potential participants in behavioral health services. Program leaders worked with the site to attempt to identify participants through data mining, but the site was still unable to find enough eligible participants despite the primary care providers' perspective that many of the sites' patients would benefit from a program like the BHIP. Program leaders decided to end the program at this site and move the associated resources to a new primary care site in the same geographic area. Despite initial success in identifying participants in need of behavioral health care at this new site, program leaders reported that they discontinued the program there in July 2016 because the site did not have enough behavioral health staff to support program implementation. Program leaders also decided not to look for

another replacement site because the other six sites generated enough enrollment. Although Montefiore Medical Center could not keep the program going in all the sites that it expected to, the awardee reached its enrollment target in the second year of the program through universal behavioral health screening at the remaining six implementing sites.

B. Implementation of the service delivery model

Montefiore Medical Center continues to implement its service delivery model on schedule and did not make significant changes to the model in the second program year. The awardee implemented new telemedicine tools such as the interactive voice response program and a smartphone application to support its integrated care model, to more fully engage participants in the program, and to regularly monitor the participants' progress through repeated screenings. BHIP leaders reported seeing an increase in the number of behavioral health follow-up visits for participants during their time in the BHIP, from 2.8 visits in quarter 4 (June to August 2015) to 4.79 visits in quarter 8 (June to August 2016). BHIP leaders also reported a decrease in the amount of time from initial enrollment to the first follow-up appointment, from 25 days in quarter 4 to 18 days in quarter 8. A higher percentage of patients also started receiving psychiatric consultations if they did not improve after 90 days in the program. The rate of consultations increased from 36 percent in quarter 4 to 92 percent in quarter 8.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of the BHIP model created advantages and challenges for program implementation. Frontline staff in all roles described the BHIP as an improvement upon earlier models of care, and several staff see this improvement as facilitating implementation. For example, primary care providers and behavioral health staff reported that the dedicated patient educator who follows up with and tracks patients while ensuring that they remain connected with their physical and behavioral health providers allows other team members to "work at the top of their license." In particular, the staff noted that primary care providers can focus more on other care needs, and licensed clinical social workers can focus on therapy rather than spending time on telephone outreach and other administrative tasks.

The behavioral health staff also said that the program's patient registry and telemedicine tools are important facilitators of their work. Most respondents reported that these tools are easy to use and provide the functions they need in order to do their jobs more effectively. For example, behavioral health staff reported that the patient registry helped them to more easily identify participants' needs (such as follow-up screenings) and to prioritize next steps to address those needs. Patient educators reported that the interactive voice response and smartphone application alleviated the administrative burdens of calling participants to remind them of appointments and administering follow-up screenings. The educators therefore have more time for more substantive telephone outreach to participants.

Despite the enthusiasm for these technologies, some frontline staff also noted that the lack of integration between the patient registry and Montefiore Medical Center's electronic medical record (EMR) posed a barrier to implementation. To track all required program metrics, staff must switch between the two platforms and "double document" participant information, which can be time-consuming and takes away from the staff's time for other activities such as outreach. Program leaders expect to integrate the patient registry fields into the EMR in the future, but were uncertain about the timeline.

2. Implementation processes

> "Patient educators are spending a lot of time making sure that the registry is up to date and trying to help the social workers catch up on documentation. This pulls them away from being able to do that really important telephone outreach directly to the patients."
>
> *— Program leader*

Program leaders and staff identified the staff's commitment to and engagement in the BHIP model as key facilitators of program implementation. In particular, respondents noted that buy-in from primary care providers is an important and successful element of the implementation process. Behavioral health staff at some sites reported that the presence of primary care providers at the weekly behavioral health meetings improved buy-in to the program because the meetings give the providers an opportunity to see their patient's screening scores and other data on participants' progress. Including providers in these weekly meetings also strengthened their relationships with the behavioral health team. In additional, several frontline staff said that the behavioral health team's flexibility and responsiveness has been critical to engaging primary care providers in the program.

Behavioral health staff stressed the fact that the engagement of primary care providers is particularly important to the BHIP's success because of the impact that this support can have on the participants' willingness to fully take advantage of behavioral health care. Several staff noted that as primary care providers became more engaged, they became more inclined to use "warm handoffs" (that is, introducing the participant to the behavioral health team in person) rather than notifying the behavioral health team by phone or through an EMR message.

> "They trust their primary care doctor. If their primary care doctor is concerned, receptive to the program, and knows what the program can do for the patient, the patient will come into treatment."
>
> *— Behavioral health team member*

Staff suggested that this approach helps participants to be more receptive to the program because they trust their primary care provider.

> "It's one thing to talk about the research out there more generally, but when you're able to say, 'Look at some of these [other] sites that have very similar populations to yours. This is some of the progress we're seeing, and this is because of the great work that our behavioral health teams are doing.'"
>
> *— Program leader*

However, Montefiore Medical Center faced an initial challenge in gaining staff support in some phase 2 sites for implementing the program, in part because these sites had less experience with integrated care than did the phase 1 sites. Respondents noted that BHIP leaders used examples from the phase 1 sites to demonstrate the benefits of the program, as a means to build support from the staff and help them learn from the experience of phase 1 sites that are similar to their own.

BHIP leaders also provided significant training and hands-on support to all implementing sites so that they could determine the best way to implement the BHIP with fidelity to the model but in a manner that dovetails with their unique setting and workflow. To enhance the sites' ability to implement the program without significant administrative support after the HCIA R2 funding ends, program leaders have been encouraging the behavioral health teams to take ownership of the program and use the self-monitoring measures to adapt the BHIP to their own site and to improve it.

Despite their success in engaging staff in the program, BHIP program found it challenging to maintain a fully staffed behavioral health team and to manage caseloads at a few implementing sites. In particular, program leaders and frontline staff cited the turnover of social workers at some sites as a challenge. Program leaders attributed this situation to the fact that these staff transferred from one Montefiore Medical Center site to another site closer to home. They also noted that the demand for behavioral health expertise in most primary care practices is growing, which has created more opportunities for social workers to transition to other practices.

3. Organizational and external context

The organizational and external context in which the BHIP operates has had a substantial effect on Montefiore Medical Center's ability to implement its service delivery model. In terms of the organizational context, the leadership team played a central role in facilitating program implementation, although there were some exceptions. In particular, frontline staff noted that the program director's open-door policy and personable leadership style helped to bring teams together and enhance collaboration within sites. Leaders at the implementing sites, such as medical directors, also continued to play a critical role in program implementation. For example, respondents noted that these leaders reinforced the importance of the program and relayed a consistent message on the need to engage with the behavioral health team.

> "We were very lucky to have a lot of support from the assistant medical director here and the medical director. They were on board with our program very early on and were very much willing to incorporate us into to the internal medicine practice. That was very helpful because they could remind the doctors [about the program] in their meetings."
>
> *— Behavioral health team member*

Despite strong implementation support from program and site leaders, changes in the leadership within the broader organization of Montefiore Medical Center created some challenges. Program leaders noted that several senior administrators who expressed support for the BHIP during the early stages of implementation left the organization. To ensure that BHIP remained a priority within the organization and to build support for future sustainability, program leaders reached out to new senior leaders in hopes that they would articulate the program's vision and purpose, as well as their plans for sustainability. Program leaders noted that these new leaders also introduced new initiatives that align with the goals of the collaborative care model but can cause complications and confusion for frontline staff. For example, program leaders described an initiative to integrate a smoking cessation program into the primary care practices. As one respondent noted, "It's not that [this initiative] isn't in line with what we're doing. But it's tricky to determine what social workers or patient educators are going to be responsible for and how it affects the workflow."

Aspects of the external context in which the BHIP operates also posed a challenge to implementation. The implementing sites are located in low-income areas of the Bronx. Furthermore, staff reported that the program captures a portion of the population that would not likely seek treatment otherwise, which presented challenges to patient engagement. Transportation to the clinics is a financial and physical barrier for many participants, particularly elderly individuals. Staff continued to report that significant mental health and social support needs have interfered with their ability to fully engage participants and to provide the necessary level of support. Participants may also disengage because of depression, domestic violence, or other stressors. Inflexible work schedules and poor access to child care have also affected the degree of participation.

BHIP leaders and frontline staff are using several strategies to overcome these barriers. Behavioral health teams help participants to access "concrete services" such as housing and transportation. Staff at some sites adjusted their schedules so that the behavioral health team is available for evening appointments. Staff noted that although this solution helped to address the scheduling challenges, the availability of evening appointments is more limited than the demand.

Several frontline staff also pointed out that the program was designed specifically for a high-needs population, which underscores the importance of making the patient educator available to follow up with participants over the phone between in-person visits. Program staff indicated that participants seem to appreciate the fact that someone calls to check in on them, which, in turn, helps to keeps them engaged. Several frontline staff mentioned that the interactive voice response system, the smartphone application, and the text messaging platform also help to keep participants engaged. Indeed, participants of all ages have bought into the smartphone application and the text messaging platform because these tools help them communicate with the behavioral health team and feel more connected to their care. However, program

> "I've gotten a lot of buy-in so far for [the text messaging platform] . . . because we can automatically remind patients of their appointments with us and with their doctors. We can check in with them. They can send us messages and let us know if they cannot come to an appointment or if they're having a problem, and we can remind them about their treatment goals. It's a really good platform for communication and [helps] them to feel like they have somebody here that they can reach out to at any point in time."
>
> *— Behavioral health team member*

leaders reported that some participants felt overburdened or confused by the interactive voice response calls. BHIP staff plan to take additional steps to improve patient education around these tools to alleviate these concerns.

C. Development of the payment model

Program leaders changed the BHIP payment model during the second year of the program. They originally planned to develop and implement a case-based model in which sites would receive the bulk of the payment upon identifying and enrolling a patient in the program. The thinking was that this model would give providers an incentive to use the most cost-effective approach possible to treat patients. For example, the model might encourage a psychiatrist to call a patient instead of arranging an in-person visit, or the model might motivate a psychiatrist to consult and coordinate with the patient's primary care provider instead of interacting directly with the patient. However, after reviewing program data from the first two years of implementation, program leaders realized that many patients would benefit from more active and extensive participation in the program. They were also worried that the case-based payment model would not provide the incentive for the behavioral health team to continue reaching out to participants who were already enrolled in the program.

BHIP leaders noted that the monthly contact capitation model is better suited to ongoing patient engagement, as it requires BHIP staff to continue to interact monthly with patients either in person, by phone, or through other technology. Montefiore Medical Center also plans to develop and implement "pay for performance" incentives for primary care providers. Program leaders hope to use carryover funds to implement the pay-for-performance model but had not received approval as of August 2016.

> "At Montefiore Medical Center and probably nationwide, you're seeing more and more demand for primary care providers, and they really have to see more patients in a shorter amount of time. We really want to be able to incentivize them in some way to help alleviate that. Even if we can't alleviate the burden of their workflow, we want to show that we recognize all the great work that they're doing because they're central to this model."
>
> *— Program leader*

Program leaders expect several factors to facilitate payment model development and implementation. The proposed monthly contact capitation approach is congruent with the federal and the New York State approaches to reimbursing for collaborative care. In addition, Montefiore Medical Center has strong relationships with its three health plan partners and expects that at least one payer may be interested in testing the model before the cooperative agreement ends. However, program leaders noted that data on cost savings are not yet available, which may dampen payer interest in testing the model. At minimum, BHIP leaders plan to test the model virtually at one to two sites during the cooperative agreement; that is, they will calculate what the payments would have been had the monthly contact capitation model been in place.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE FFS AND MEDICAID FFS AND MANAGED CARE ENROLLMENT AND CLAIMS DATA

This section describes the baseline demographic characteristics as well as the cost and utilization characteristics of Medicare FFS, Medicaid FFS, and Medicaid managed care beneficiaries who are enrolled in the BHIP. For Medicare beneficiaries, the period of analysis runs from the program launch date on February 9, 2015 through May 31, 2016. For Medicaid beneficiaries, the period of analysis runs from February 9, 2015 through June 30, 2015. The period of analysis for Medicaid beneficiaries is shorter because New York State provided data for Medicaid services through June 30, 2015 only. For all Medicare and Medicaid beneficiaries, the baseline year comprises the 365 days before each participant's enrollment date. A total of 609 BHIP participants—122 Medicare beneficiaries and 487 Medicaid beneficiaries—are included in this analysis.

A. Baseline characteristics of treatment group: Medicare FFS beneficiaries

Montefiore Medical Center began to enroll Medicare and Medicaid beneficiaries in the BHIP in February 9, 2015. As of May 31, 2016 the BHIP had a total of 3,139 participants. The majority of these BHIP participants were enrolled in Medicaid (see section B below). Of the 3,139 participants, we were able to link 792 (25 percent) to the New York State Medicare data. Most of these Medicare beneficiaries were enrolled in managed care and were not included in this analysis because data for these beneficiaries were not available.

In presenting the baseline characteristics, we restricted the treatment group to Medicare FFS beneficiaries, both Parts A and B, who had Medicare as the primary payer when they became eligible for awardee-provided services (that is, their enrollment date) and who met all program criteria for a period of 90 days during the 365 days immediately before their enrollment, including their date of enrollment. In addition, they had to be enrolled in the BHIP on or before May 31, 2016 in order to ensure that they would be exposed to the intervention for long enough to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters varies by participant because it is based on each participant's enrollment date. After excluding individuals who did not meet the above criteria, we were able to obtain baseline characteristics for a total of 122 participants, which is 15 percent of the beneficiaries who were linked to the New York State Medicare data.

The Medicare FFS beneficiaries participating in the BHIP during the first four program quarters are a diverse group of individuals in terms of demographic and health status characteristics (Table 2). Forty-three percent of these participants are under the age of 65, whereas 7 percent are 85 or older. They are also far more likely to be female (78 percent) or to be part of a racial or ethnic minority group (66 percent). Black people account for almost half of the Medicare FFS beneficiaries alone (48 percent), which reflects the racial composition of the Bronx, where the intervention hospitals are located. Thirty-eight percent are dually eligible for Medicare and Medicaid, compared with only 18 percent nationwide. The percentage of beneficiaries who were enrolled in Medicare FFS because of disability (51 percent) is much higher than the national average of 24 percent. In addition, the average hierarchical condition category (HCC) risk score of 1.47 is 47 percent higher among participants who are Medicare FFS beneficiaries than the national average of 1. The distribution of HCC risk scores is

associated with very high average expected expenditures. Taken together, the characteristics of Medicare FFS beneficiaries participating in the BHIP suggest that they are in poor health and that they have a great need for health care services.

Medicare FFS beneficiaries participating in the BHIP had high rates of service use and expenditures in the 365 days before enrollment, which is consistent with their needs. Table 3 shows the baseline cost of care in total and by major types of services—calculated as the average Medicare payment per beneficiary per month (PBPM).[5] The total average Medicare payment PBPM during the baseline year was $1,754. Quarterly estimates ranged from as low as $1,563 in the third quarter to as high as $2,009 in the first quarter. The largest drivers of the total cost of care were the average Medicare payment PBPM for acute inpatient ($758), outpatient ($383), and physician ($318) services. These costs represent 83 percent of the total cost of care. Montefiore Medical Center expects to reduce hospitalizations and ED visits compared with what the rates would have been absent the BHIP by offering more comprehensive follow-up and preventive primary care than Medicare FFS beneficiaries typically receive. If reductions in the use of these high-cost services are achieved, then a decline in Medicare expenditures for BHIP participants in the post-intervention period should become evident and would be reflected in our impact estimates.

The average rate of acute hospital admissions was 497 per 1,000 Medicare FFS beneficiaries participating in the BHIP per year during the baseline year—approximately double the national average of 274 per 1,000 Medicare FFS beneficiaries per year.[6] Twenty-five percent of Medicare FFS participants were admitted to a hospital, and 13 percent of those who were discharged had a readmission within 30 days; this is lower than the national average of 18 percent. The average annual rate of ED visits that did not lead to a hospitalization was 829 per 1,000 Medicare FFS beneficiaries participating in the BHIP—almost double the national annual rate of 445 per 1,000 Medicare FFS beneficiaries. Almost half (47 percent) of these participants had an outpatient ED visit. These figures suggest that there is an opportunity to reduce ED visits through the health care services provided by the BHIP. During the baseline year, the average annual rate of primary care visits in any setting was 5,843 per 1,000 participating Medicare FFS beneficiaries, whereas the average annual rate of primary care visits in ambulatory settings was 4,326 per 1,000 participating Medicare FFS beneficiaries. The high rate of specialist service use in ambulatory settings was 11,399 per 1,000 participating Medicare FFS beneficiaries, suggesting there may be a need for better access to primary care—a key component of the BHIP.

[5] Months referred to in our calculations are 30-day periods rather than calendar months.

[6] All national data in this paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 122)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	53	43
65 to 74	41	34
75 to 84	19	16
85 and older	9	7
Gender		
Female	95	78
Male	27	22
Race		
White	42	34
Black	59	48
Other	5	4
Hispanic	16	13
Original reason for Medicare eligibility		
Old age and survivor's insurance	59	48
Disability insurance benefits	62	51
End-stage renal disease (ESRD)[a]	1	1
Other status		
Medicare/Medicaid dual status[b]	46	38
HCC score[c]		Statistic
Mean		1.47
25th percentile		0.71
Median		1.12
75th percentile		1.88

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is the date when the participant became eligible for awardee-provided services. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3. Baseline year costs and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	122	112	116	120	122
Average Medicare costs PBPM[a]					
Total	1,754 (331)	2,009 (564)	1,652 (371)	1,563 (392)	1,801 (455)
Acute inpatient	758 (215)	610 (217)	804 (271)	712 (291)	892 (331)
Inpatient other[b]	36 (33)	142 (140)	8 (8)	0 (0)	0 (0)
Outpatient[c]	383 (71)	438 (170)	342 (80)	368 (81)	387 (80)
Physician services	318 (39)	291 (48)	331 (49)	324 (56)	324 (48)
Home health	95 (28)	98 (45)	131 (44)	54 (28)	100 (41)
Skilled nursing facility	147 (50)	403 (165)	19 (19)	94 (66)	85 (84)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	16 (4)	27 (12)	17 (10)	10 (4)	12 (4)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	497 (105)	328 (104)	531 (152)	483 (153)	634 (162)
Outpatient ED visits	829 (161)	765 (199)	849 (201)	725 (164)	967 (220)
Observation stays	35 (35)	0 (0)	35 (35)	35 (34)	67 (46)
Primary care visits in any setting	5,843 (716)	5,570 (1,556)	5,874 (979)	5,386 (924)	6,503 (972)
Primary care visits in ambulatory settings	4,326 (478)	4,187 (1,403)	4,388 (824)	4,281 (744)	4,435 (378)
Specialist visits in any setting	14,774 (1,613)	14,963 (1,914)	14,120 (1,664)	12,912 (1,441)	17,008 (2,951)
Specialist visits in ambulatory settings	11,399 (1,083)	12,306 (1,458)	10,970 (1,211)	10,289 (1,127)	12,039 (1,369)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	25 (4)	8 (3)	11 (3)	9 (3)	13 (3)
Percentage with an outpatient ED visit[e]	47 (5)	15 (3)	18 (3)	16 (3)	18 (4)
Percentage with an observation stay[f]	3 (2)	0 (0)	1 (1)	1 (1)	2 (1)
Percentage with a 30-day readmission among all discharges	13 (5)	0 (0)	7 (7)	25 (13)	13 (9)
Percentage of participants with a readmission among all participants	3 (2)	0 (0)	1 (1)	3 (1)	2 (1)

Source: Mathematica analysis of information from the awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so forth. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days in which each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Baseline characteristics of treatment group: Medicaid FFS and managed care beneficiaries

In presenting the baseline characteristics of Medicaid beneficiaries participating in the BHIP, we restricted the treatment group to Medicaid FFS and managed care beneficiaries who were enrolled in Medicaid when they became eligible for awardee-provided services (that is, their enrollment date) and who met all program criteria for a period of 90 days during the 365 days immediately before their enrollment. After excluding individuals who did not meet the above criteria, we were able to link 2,210 participants to the New York State Medicaid data.

To be included in this report, beneficiaries also had to be enrolled in the BHIP on or before June 30, 2015 so that we had a full year of baseline Medicaid data. This criterion excluded a significant portion of Medicaid beneficiaries who enrolled in the BHIP after that date. We can report baseline demographic and health status characteristics for 487 participants (22 percent of those linked to the New York State Medicaid data); we can also report health care cost and utilization information for 455 participants (21 percent). Ninety of these participants are dual beneficiaries, and 365 of them are non-dual beneficiaries. Health care cost and utilization characteristics are presented separately for dual and non-dual Medicaid beneficiaries. Based on the ICD-9 codes for Medicaid claims occurring during each beneficiary's baseline year, we used the Chronic Disability Payment System (CDPS) software to generate chronic condition categories and risk scores.

Table 4 illustrates the demographic and health status diversity of Medicaid beneficiaries participating in the BHIP as of June 30, 2015. About 51 percent are middle-age adults (ages 35 to 64), whereas only 10 percent are children or adolescents (ages 3 to 17) and 15 percent are adults who are 65 or older. They are also far more likely to be female (78 percent) and either black or Hispanic (71 percent), reflecting the racial and ethnic diversity of the Bronx, which is where the intervention hospitals are located. Seventy-eight percent are not dually eligible for Medicare and Medicaid, 73 percent are covered by a managed care plan, and 97 percent receive full Medicaid benefits. These participants became eligible for Medicaid for three main reasons: they received Supplemental Security Income because they are blind or disabled (21 percent), they received Temporary Assistance for Needy Families benefits because they are low-income adults (32 percent), and they were eligible for Medicaid when it was expanded through the Affordable Care Act (23 percent).

BHIP Medicaid participants also have a wide range of chronic conditions, poor health status, and a great need for care. About 82 percent of them appear in one or more CDPS categories, and their average CDPS risk score is 1.86, which is 86 percent higher than the national average of 1 (Table 5). Their chronic conditions include cardiovascular conditions (37 percent), pulmonary conditions (28 percent), skeletal and connective tissue conditions (27 percent), and gastrointestinal conditions (24 percent). Psychiatric conditions, however, are the most common chronic conditions by far; 53 percent of participants manifest these conditions. The distribution of chronic conditions reflect the fact that Montefiore Medical Center deliberately targeted individuals who have depression, anxiety, or an alcohol use disorder, as well as children and adolescents with ADHD. We also specifically looked at whether participants had a Medicaid claim for any of these targeted conditions during the year before they enrolled in the program. We found that 80 percent had at least one Medicaid claim with a diagnosis for any of the four

targeted conditions during the baseline year. In particular, 66 percent had at least one claim with a diagnosis of depression, 34 percent had a claim with a diagnosis of anxiety, 4 percent had a claim with a diagnosis of an alcohol use disorder, and 2 percent had a claim with a diagnosis of ADHD.

Table 4. Baseline demographic characteristics of Medicaid FFS and managed care beneficiaries enrolled in the awardee's program through June 30, 2015

	All enrollees (N = 487)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
3–17 years (children and adolescents)	49	9
18–34 years (young adults)	116	23
35–64 years (middle-age adults)	248	50
65+ years (older adults)	74	15
Gender		
Female	382	78
Male	105	21
Race/Ethnicity		
Non-Hispanic white	29	5
Non-Hispanic black	118	24
Hispanic	226	46
Other	11	2
Type of benefits		
Full Medicaid benefits	471	96
Restricted benefits	16	3
Medicaid eligibility category		
SSI aged	27	6
Non-SSI aged	30	6
SSI blind/disabled	102	21
Non-SSI blind/disabled	14	3
TANF, safety net, or low-income family adults	155	32
Other adults	113	23
TANF, safety net, or low-income family children	25	5
Other children	21	4
Managed care enrollment		
Comprehensive managed care plan	356	73
Long-term care carve-out	41	8
No managed care enrollment	90	18

Table 4 *(continued)*

Characteristics	All enrollees (N = 487)	
	Number	Percentage
Medicare/Medicaid dual status		
Dual	107	21
Non-dual	380	78
HCBS waiver enrollment		
Enrolled in any HCBS waiver	5	1
Not enrolled in an HCBS waiver	482	98
Third-party insurance		
Third-party insurance	17	3
No third-party insurance	470	96
Quarter of initial program enrollment		
Q1 2015	238	48
Q2 2015	249	51

Source: Mathematica analysis of information from awardee's finder file and from Medicare claims and enrollment data as of June 30, 2015.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. Medicaid beneficiaries must be eligible for at least 90 days in the baseline year and on the enrollment date to be included in the sample. Beneficiary characteristics other than CDPS category and risk score were measured in the last month of the baseline year.

Table 5. Distribution of CDPS categories for Medicaid FFS and managed care beneficiaries enrolled in the awardee's program through June 30, 2015

	All enrollees (N = 487)	
Characteristics	**Number**	**Percentage**
Selected CDPS categories[a]		
Beneficiaries in one or more CDPS categories	401	82
Psychiatric	258	52
Cardiovascular	181	37
Pulmonary	137	28
Skeletal and connective	132	27
Gastrointestinal	117	24
Beneficiaries not in a CDPS category	86	17
CDPS risk score[a]		Statistic
Mean		1.86
25th percentile		0.74
Median		1.35
75th percentile		2.38
BHIP target chronic conditions (N = 455)[b]		Percentage
Beneficiaries with any of the four target conditions		80
Depression		66
Anxiety		34
Alcohol use disorder		4
ADHD		2

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of June 30, 2015.

[a]Categories and risk scores are defined by using the CDPS software and are based on the ICD-9 codes on Medicaid claims occurring during each beneficiary's baseline year. The five most common conditions within the sample are reported.

[b]Excludes Medicaid beneficiaries enrolled in a state plan, or who had partial benefits or third-party benefits during the month in which they enrolled in the program.

Consistent with their poor health status and their greater health care needs, both non-dual and dual Medicaid beneficiaries participating in the BHIP had high rates of service use and costs in the 365 days before enrollment. Tables 6 and 7 show the baseline cost of care—in total and by major types of services—calculated as the average PBPM Medicaid payment for non-dual and dual beneficiaries, respectively.

Table 6. Baseline year costs and health care utilization for Medicaid non-dual beneficiaries enrolled in the awardee's program through June 30, 2015

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	365	327	339	359	365
Average Medicaid costs PBPM[b]					
Total payment	1,194 (144)	1,050 (141)	1,133 (186)	1,268 (211)	1,256 (1202)
Acute inpatient stays	371 (73)	348 (86)	352 (118)	329 (84)	416 (998)
Total ED payment	29 (3)	28 (4)	24 (4)	30 (9)	35 (27)
ED visits that lead to an inpatient stay	3 (1)	3 (1)	3 (2)	1 (<0.5)	3 (14)
ED visits that don't lead to an inpatient stay	27 (3)	26 (4)	21 (3)	28 (9)	32 (14)
Pharmacy	344 (88)	241 (80)	319 (116)	468 (179)	332 (85)
Other[c]	449 (40)	433 (51)	437 (42)	442 (45)	472 (158)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	441 (79)	488 (99)	355 (106)	444 (119)	432 (1014)
Total ED visits	1,398 (123)	1,361 (166)	1,212 (166)	1,473 (302)	1,506 (1525)
ED visits that lead to an inpatient stay	215 (48)	218 (53)	171 (59)	210 (71)	244 (1013)
ED visits that don't lead to an inpatient stay	1,184 (101)	1,143 (151)	1,040 (136)	1,263 (292)	1,263 (531)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015. New York State provided Medicaid data for services through June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary was enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Excludes Medicaid beneficiaries enrolled in a state plan, or who had partial benefits or third-party benefits during the month in which they enrolled in the program.

[b]Total Medicaid expenditures for the baseline year or a given quarter exclude capitated payments and were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include practitioner visit services that are not delivered in an office as well as dental, eye care, home health, laboratory, intermediate care facility, nursing home, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

Table 7. Baseline year expenditures and health care utilization for Medicaid dual beneficiaries enrolled in the awardee's program through June 30, 2015

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	90	87	88	89	90
Average Medicaid expenditures PBPM[b]					
Total payment	1,304 (186)	1,156 (173)	1,178 (167)	1,156 (166)	1,707 (425)
Acute inpatient stays	135 (92)	29 (11)	46 (16)	56 (17)	401 (364)
Total ED payment	3 (1)	5 (2)	2 (1)	2 (1)	3 (2)
ED visits that lead to an inpatient stay	0 (<0.5)	0 (<0.5)	0 (<0.5)	0 (<0.5)	0 (<0.5)
ED visits that don't lead to an inpatient stay	3 (1)	5 (2)	2 (1)	1 (1)	3 (2)
Pharmacy	79 (32)	76 (32)	79 (30)	69 (32)	93 (40)
Other[c]	1,087 (143)	1,046 (165)	1,051 (162)	1,030 (155)	1,210 (174)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	560 (131)	373 (125)	692 (218)	684 (195)	492 (165)
Total ED visits	881 (248)	933 (253)	369 (124)	911 (313)	1,296 (498)
ED visits that lead to an inpatient stay	114 (46)	140 (103)	92 (64)	182 (89)	45 (45)
ED visits that don't lead to an inpatient stay	766 (244)	793 (237)	277 (109)	729 (305)	1,252 (497)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015. New York State provided Medicaid data for services through June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary was enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Excludes Medicaid beneficiaries enrolled in a state plan, or who had partial benefits or third-party benefits during the month in which they enrolled in the program.

[b]Total Medicaid expenditures for the baseline year or a given quarter exclude capitated payments and were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include practitioner visit services that are not delivered in an office as well as dental, eye care, home health, laboratory, intermediate care facility, nursing home, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

For non-dual Medicaid beneficiaries, the total average PBPM Medicaid payment during the baseline year was $1,194 (Table 6). Quarterly estimates ranged from as low as $1,050 in the first quarter to as high as $1,268 in the third quarter, with no discernable pattern over time. The largest drivers of the total cost of care were payments for acute inpatient ($371) services, pharmacy services ($344), and "other" ($449) services. In combination, these services represent 97 percent of the total cost of care.

The lower panel in Table 6 shows that, for non-dual Medicaid FFS and managed care beneficiaries, the average rate of acute hospital admissions was 441 per 1,000 non-dual Medicaid beneficiaries per year during the baseline year. Quarterly rates ranged from as low as 355 in the second quarter to as high as 488 in the first quarter. The total average rate of ED visits was 1,398 per 1,000 beneficiaries per year. The total annual rate of ED visits that led to an inpatient stay was 215 per 1,000 beneficiaries per year; the rate of ED visits that don't lead to an inpatient stay was 1,184 per 1,000 beneficiaries per year. Quarterly rates ranged from as low as 1,212 in the second quarter to as high as 1,506 in the fourth quarter. There was no discernable pattern in either hospital admissions or ED visits rates over time.

For dual Medicaid beneficiaries, the total average PBPM Medicaid payment during the baseline year was $1,304 (Table 7). Quarterly estimates ranged from as low as $1,156 in the first and third quarters to as high as $1,707 in the fourth quarter, with no discernable pattern over time. The largest driver of the total cost of care was "other" services ($1,087). They include care in nursing homes and intermediate care facilities, which together represent 83 percent of the total cost of care.

The lower panel in Table 7 shows that, during the baseline year, for dual Medicaid beneficiaries, the average rate of acute hospital admissions was 560 per 1,000 dual Medicaid beneficiaries per year during the baseline year. Quarterly rates ranged from as low as 373 in the first quarter to as high as 692 in the second quarter. The total average rate of ED visits was 881 per 1,000 beneficiaries per year. The rate of ED visits that lead to an inpatient stay was 114 per 1,000 beneficiaries per year; the rate of ED visits that don't lead to an inpatient stay was 766 per 1,000 beneficiaries per year. Quarterly rates ranged from as low as 369 in the second quarter to as high as 1,296 in the fourth quarter. There was not a discernable pattern in the rate of hospital admissions or ED visits over time.

Montefiore Medical Center expects to reduce hospitalizations and ED visits among Medicaid beneficiaries compared with what the rates would have been in the absence of the BHIP by offering more comprehensive follow-up and preventive primary care than Medicaid FFS and managed care beneficiaries typically receive. If the awardee achieves this goal, then a decline in Medicaid expenditures for BHIP participants in the post-intervention period should become evident and would be reflected in our impact estimates.

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in

Table 8: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 8. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Montefiore Medical Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	218
Projected Medicaid population with 6 months of program exposure	3,755
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,878
Likelihood of all-cause hospitalizations	2,932
MDE sample size requirement to detect 20% effect	
Total expenditures	970
Likelihood of all-cause hospitalizations	733
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, moderate rate of identification of treatment group with claims with some dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	Possible electronic health record data

DDB = difference-in-difference Bayesian

We anticipate conducting a rigorous impact analysis. We will use propensity score matching techniques to select comparison beneficiaries who live in the Bronx, have one of the program's target conditions, and who are similar to BHIP participants in terms of key characteristics. Because provider judgment is used in enrolling beneficiaries, we will explore including all patients with the target conditions who have visited a BHIP physician as part of the treatment group (rather than only including enrolled patients). We have sufficient enrollment to identify plausible effects on claims-based outcomes.

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V. NEXT STEPS

A. Implementation evaluation

As Montefiore Medical Center enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We successfully executed a business associate agreement (BAA) and a memorandum of understanding (MOU) with Montefiore Medical Center, and the awardee has delivered various sets of identifiable data for currently enrolled beneficiaries. The awardee is also submitting revisions to a new institutional review board process that would allow it to share with us the data on beneficiaries who receive services at Montefiore-owned non-BHIP sites. We anticipate being able to use this group of beneficiaries as one of our two main potential comparison groups. More specifically, we plan to identify two potential comparison groups that comprise beneficiaries who are not participating in the BHIP but who receive health care services at (1) the 16 Montefiore-owned non-BHIP sites located in the Bronx, or at (2) other sites not owned by the awardee but that are also located in the Bronx. We will then use propensity score matching techniques to identify a group of beneficiaries similar to BHIP participants in terms of key characteristics, such as demographic characteristics, targeted conditions, and prior health care costs and utilization. After selecting the matched comparison group, we will report the baseline equivalence of the two groups and estimate impacts of the BHIP on Medicare and Medicaid costs and service use.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include behavioral health patient educators, licensed clinical social workers, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, nurse practitioners, physician assistants, and clinical psychologists. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.21.

NATIONAL ASSOCIATION OF CHILDREN'S HOSPITALS AND RELATED INSTITUTIONS

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REPORT

APPENDIX B.21

HCIA Round Two Evaluation: National Association of Children's Hospitals and Related Institutions

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Coordinating All Resources Effectively (CARE) program being implemented by the National Association of Children's Hospitals and Related Institutions, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the awardee's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). At the time of writing this report, we had not yet received sufficient claims data to begin our quantitative impact evaluation for this awardee.

Our discussion of these topics addresses the four research questions below:

1. How much progress has the National Association of Children's Hospitals and Related Institutions made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the awardee and its sites addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of National Association of Children's Hospitals and Related Institutions' program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CARE program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The National Association of Children's Hospitals and Related Institutions is using funding from HCIA R2 to create the CARE program (Table 1). The awardee is a subsidiary of the Children's Hospital Association, a member organization for 220 children's hospitals throughout the United States. The awardee has engaged 10 children's hospitals across the country as CARE implementing sites to use care management, care coordination, family engagement, and practice transformation to improve the care of children with medical complexity (CMC). The awardee uses a quality improvement learning collaborative model to support program implementation. Each hospital is working with its own hospital-based program for CMC and with one to eight primary care practices. The 10 hospitals participating in the CARE program are as follows:

1. Mattel Children's Hospital in Los Angeles, California
2. Lucile Packard Children's Hospital in Palo Alto, California
3. Children's Hospital Colorado in Aurora, Colorado
4. Children's National Medical Center in the District of Columbia
5. Wolfson Children's Hospital in Jacksonville, Florida
6. St. Joseph's Children's Hospital in Tampa, Florida
7. Children's Mercy Hospital and Clinics in Kansas City, Missouri
8. Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio
9. The Children's Hospital of Philadelphia in Philadelphia, Pennsylvania
10. Cook Children's Health Care System in Fort Worth, Texas

Through the CARE program, the awardee is targeting children with the most complex chronic conditions, typically involving multiple organ systems and requiring many specialist health care providers. For the purposes of the program, CMC are identified by using the 3M Clinical Risk Group (CRG) algorithm for billing or claims data. Specifically, the awardee targets children who are classified into the highest categories of the algorithm, which encompass children with lifelong chronic conditions, complex chronic conditions, and malignancies (CRG groups 5b, 6, 7, 8, or 9). The awardee estimates that CMC make up about 6 percent of the population but 40 percent of the costs of children enrolled in Medicaid.

The awardee aims to enroll approximately 8,064 CMCs in the CARE program across the 10 participating hospital sites. Participating hospitals identify potential participants from three sources: (1) existing hospital programs for CMC, (2) analyses of a proprietary administrative and billing database from the children's hospitals, and (3) referrals from providers. The 3M CRG algorithm is then applied to internal billing or Medicaid claims data for the child to confirm eligibility.

The awardee's primary patient care intervention strategies are care management and care coordination, which are provided to all participants through collaboration between hospital-based staff, including care coordinators and social workers, and staff in collaborating primary care practices. The CARE program includes five care coordination and management processes, or

"change concepts," for implementation and quality improvement at participating hospitals and primary care practices: (1) a patient registry, (2) identification of members of the child's care team ("dynamic care team"), (3) access plans, (4) care plans, and (5) transitions of care. For each change concept, program staff developed guiding principles, common core elements of change, suggested actions, and quality measures. Program staff support participating hospitals and primary care practices in implementing the five change concepts through a national learning collaborative and local practice transformation facilitators employed by the hospitals.

The awardee's anticipated outcomes for the CARE program are to improve the child and caregiver's experience with care, reduce family stress related to care, improve physician satisfaction, decrease the number of hospitalizations, decrease the unplanned all-cause readmission rate, decrease the number of inpatient days, decrease the inpatient length of stay, decrease emergency department (ED) visits, and reduce total medical expenditures.

The awardee is providing support for each participating hospital to create and negotiate its own payment model with a state Medicaid agency or Medicaid managed care plan. The awardee has partnered with Truven Health Analytics to support sites with Medicaid claims data processing and Milliman for actuarial consulting. The awardee's sites have engaged with four state Medicaid agencies (California, Colorado, Florida, and Missouri) and five Medicaid managed care organizations (in California, the District of Columbia, Ohio, Pennsylvania, and Texas) to acquire Medicaid plan data and negotiate potential payment models.

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified the following successes achieved by the awardee during the first year of its cooperative agreement:

- **Developed a large learning collaborative.** The awardee had engaged 10 children's hospitals and more than 40 primary care practices in its efforts to improve care for CMC.
- **Built processes for care coordination and management.** The awardee developed its care processes for CMC, and participating hospitals and practices were integrating these processes into routine clinical care.

We also identified the following challenges that the awardee faced in implementing the CARE program and its strategies for addressing them:

- **Enrollment.** Participating hospitals spent much of the first year of the cooperative agreement establishing the following: (1) contracts with the National Association of Children's Hospitals and Related Institutions, and with independent practices, (2) data use agreements, and (3) IRB protocols. The hospitals also devoted time to hiring staff and to recruiting primary care practices, which were needed to enroll and serve participants in the program. To facilitate enrollment, most hospitals limited formal consent processes to one-third of participants, whose families receive surveys through which they describe their experiences with the care they received. The remainder of eligible participants were passively enrolled based on receiving care at a participating hospital-based CMC program or primary care practice.

- **Data acquisition and analysis.** The awardee and participating hospitals spent much of the first year negotiating data sharing agreements with state Medicaid agencies and Medicaid managed care organizations. They had planned to use the Medicaid data to help identify eligible participants, monitor program impacts on utilization and costs, and plan payment models. The awardee used a third party to collate Medicaid data to address the complexity and volume of data across multiple payers and to standardize the data for comparability across sites.

Finally, we identified the following lessons learned by the awardee in implementing its program:

- Acquiring Medicaid claims data and hiring new staff within hospitals was time-consuming, suggesting that a pre-award planning period could have been beneficial.
- Some payers were interested in payment reform but were reluctant to consider models applicable to only a small population or to specific provider groups; some payers were reluctant to consider any alternative payment models for the target population.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the National Association of Children's Hospitals and Related Institutions made the following changes to the CARE program:

- Placed a renewed emphasis on enrollment, including providing monthly site-specific feedback on progress toward enrollment goals, resulting in reaching over 90 percent of its enrollment goal
- Worked with implementing sites to tailor the program's care processes to the needs and resources of participating hospital-based CMC programs and primary care practices
- Shifted the emphasis of learning collaborative sessions from expert presentations to peer-to-peer learning among implementing site staff supplemented with expert presentations and technical assistance

Below we note the key challenges that the awardee has worked to address in the second year of its cooperative agreement, including factors that have influenced the awardee's ability to address these challenges.

- **Managing an enrollment and consent process across multiple sites.** The awardee implemented a modified consent and enrollment process to limit formal consent to one-third of participants, who would receive a care experience survey, and implemented passive enrollment for the remaining participants. By August 2016, the awardee had enrolled 92 percent of its 8,064 projected participants.
- **Obtaining Medicaid claims data.** Acquiring data for each site continued into the second year of the cooperative agreement, but was in place for 9 of the 10 implementing sites.
- **Tailoring the program to the needs and contexts of multiple sites.** In implementing the program, the awardee had to consider the needs and contexts of the 10 hospital sites, their participating hospital-based outpatient CMC programs, and the primary care practices. The

awardee made significant progress in developing the infrastructure it planned for care coordination, such as patient registries, but experienced slower implementation of care processes that require direct engagement with families, such as the development of care plans.

As the awardee enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee and sites had only recently received sufficient Medicaid claims data and begun to collect enough family survey data to assess effects of the program by the middle of the second program year. They plan to analyze this data to make adjustments to the care processes in the final year of the cooperative agreement and, ultimately, estimate the impacts of the CARE program.
- Many sites have integrated the CARE program into their organization's overall priorities and payment negotiation strategy. Awardee and site leaders expect this to continue beyond the life of the cooperative agreement.
- Three sites have reached payment model agreements; one site anticipate signing an agreement in mid to late 2016. The awardee anticipates supporting the remaining sites in developing and negotiating payment models, but is unsure how many of these sites are likely to reach agreements during the final year of the cooperative agreement.

Table 1. National Association of Children's Hospitals and Related Institutions: CARE program characteristics at a glance

Program characteristic	Description
Purpose	The National Association of Children's Hospitals and Related Institutions (NACHRI) seeks to achieve three primary goals: (1) improve the experience of care for CMC and their caregivers through the duration of the program, (2) reduce family stress related to health care by 10 percent, and (3) reduce overall medical expenditures by 6.8 percent.
Components	• Care management and care coordination. Provided to all participants and their caregivers through collaboration among hospital-based staff, hospital- and practice-based care coordinators, and staff in collaborating primary care practices • Practice-based quality improvement and transformation. Support for up to six primary care practices per hospital site to transform care processes for CMCs, consistent with the principles of the medical home • Education and training. Learning collaborative for participating hospitals and practices based on The Breakthrough Series from the Institute for Healthcare Improvement
Target population	CMC are defined as children classified into the 3M CRG software categories 5b, 6, 7, 8, or 9 by using billing or claims data. These categories encompass children with lifelong chronic conditions, complex chronic conditions, and malignancies.
Theory of change/theory of action	NACHRI hypothesizes that improved care management and coordination, heightened family engagement, and practice-based quality improvement and transformation will lead to better care experiences, reduced family stress, and reduced costs of providing health care to CMC.
Payment model	Shared savings, capitated payment for care management/coordination services
Award amount	$23,198,916
Launch date[a]	5/1/2015
Setting	Hospitals and primary care practices
Market area	Urban, suburban
Market location	CA, CO, DC, FL, MO, OH, PA, TX
Outcomes	• Better care. Improve patient and caregiver experience. • Healthier people. Reduce family stress related to care by 10%. • Smarter spending. Reduce medical expenditures by 6.8%.

[a]After the initial planning period, the awardee's program began to operate as of this date.

CARE = Coordinating All Resources Effectively; CMC = children with medical complexity; CRG = Clinical Risk Group

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the National Association of Children's Hospitals and Related Institutions in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff in June 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with program leaders from the awardee and six hospital sites, which included the following:

1. Children's Hospital Colorado
2. Wolfson Children's Hospital
3. Children's Mercy Hospital and Clinics
4. Cincinnati Children's Hospital Medical Center
5. The Children's Hospital of Philadelphia
6. Cook Children's Health Care System

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

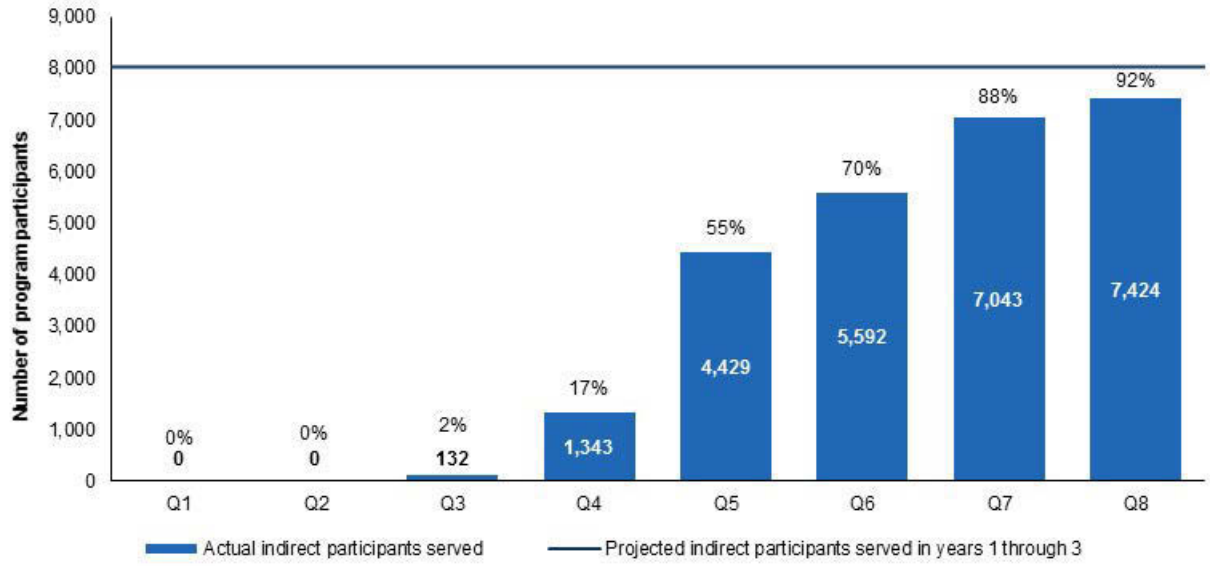
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the awardee's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the National Association of Children's Hospitals and Related Institutions reported to the implementation and monitoring contractor that it indirectly served 7,424 participants from May 2015 (the launch of its program) through August 2016, which represents about 92 percent of its 8,064 projected indirect participants (Figure 1). Interview respondents attributed this on-target enrollment primarily to an increased emphasis on participant enrollment over the prior 12 months and management of several previous barriers to enrollment, as we describe below.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. NACHRI does not have direct program participants.

The awardee and site leaders described two primary facilitators to enrollment: (1) placing renewed emphasis on enrollment during the second program year and (2) leveraging existing relationships with primary care practices and health plans. After challenges with enrollment in the first year of the cooperative agreement, awardee and site leaders reassessed the information and assumptions used for the original enrollment goal of 9,864 children, then revised the goal to 8,064 based on information that was considered more up-to-date and reflective of the population of CMC enrolled in Medicaid. They also reset the timing for reaching the enrollment goal from the end of the cooperative agreement to November 2016 so that participants would be exposed to the program for at least one year. Awardee leaders then began to provide monthly feedback to site project teams and hospital chief executives on enrollment progress compared to goals at each site. Carryover funds from the first year were also allocated to help support additional staff time

at the sites for enrollment. Program and site leaders credited this renewed emphasis for the significant gains in enrollment during the second year of the cooperative agreement.

For several sites, enrollment efforts were facilitated by leveraging relationships with owned or affiliated primary care practices. For example, two of the sites that made the fastest progress on enrollment were working exclusively with primary care practices owned by their health systems, which allowed for faster practice enrollment and engagement. In contrast, sites working with independent primary care practices typically had slower enrollment. Enrollment increased when they were able to engage practices through other affiliations, such as accountable care or managed care organizations.

The awardee and site leaders also described three primary barriers to enrollment: (1) the institutional review board (IRB) and consent processes, (2) the multiple processes needed for identifying eligible children, and (3) the time needed to recruit and contract with independent primary care practices. First, the IRB and consent processes continued to present challenges for enrollment during the second year of the cooperative agreement. The awardee originally planned to conduct a survey with all participants' caregivers at multiple time points to provide data on experiences with care before and during the program. Because of the potential to use this data for research, the awardee developed a centralized IRB review process. However, only six sites were able to participate in this centralized process, while four sites were required by their institutions to maintain local IRB review. As a result, multiple IRB applications were required for initial approval and annual reapproval for data collection, which delayed enrollment efforts. IRB requirements for in-person consent of caregivers for the survey also made it more challenging to enroll families than if they could be enrolled by telephone. The awardee and sites addressed this by deciding to survey only one-third of participants, so only these participants are required to provide formal consent. Other participants are passively enrolled if they are receiving care at a participating practice site. These changes have reduced but not eliminated the challenges with the IRB and consent processes.

Second, several site leaders described challenges in identifying eligible children. The awardee and many sites initially planned to use Medicaid claims data to identify eligible children who received care at participating practices, by using the CRG algorithm. But the process to obtain claims data took the majority of the first year for most sites. As an alternative, sites turned to internal billing data and a proprietary hospital utilization database maintained by the National Association of Children's Hospitals and Related Institutions. However, when they applied the CRG algorithm to these data and made comparisons with lists of children enrolled in hospital-based programs for CMC, they frequently identified eligible children who were missed because of limitations in the data used (for example, not capturing care at other facilities). This was attributed to the lack of data from other hospitals or unaffiliated outpatient settings. As a result, most sites used a combination of internal billing data, manual chart reviews, and Medicaid data to identify eligible children. Although the sites have developed processes that work for their data situations, these processes have been more time-consuming than anticipated.

Third, for sites that did not have affiliated primary care practices or that chose to work with independent practices, this process was also more time-consuming than anticipated. These sites reported that they did not wish to pursue formal agreements with independent practices until award funding was verified. Upon award funding, the sites had to confirm practices' interest in

the program, recruit additional practices as needed, and establish contracts with the practices. The sites were unable to enroll children from the practices until they had a contractual agreement. Some sites required IRB approval prior to contracting, and other sites required an executed contract prior to IRB approval. In many cases, negotiating a contract took much of the first program year. However, awardee and site leaders reported that they had reached agreements with all participating practices as of early 2016.

B. Implementation of the service delivery model

The awardee made substantial progress in implementation of the CARE program during the second year of the cooperative agreement. As of early 2016, the program had engaged with nine hospital-based outpatient CMC programs and 40 primary care practices, meeting its goal of three to six practices per hospital site. One site did not have a hospital-based outpatient CMC program and is therefore only implementing the program through primary care practices. Based on its reports of self-monitoring measures, the awardee has made significant progress in developing the infrastructure for care coordination but experienced slower implementation of care processes that require direct engagement with families and that are more labor intensive for clinicians and practice staff. For example, in the seventh program quarter, the awardee reported that all enrolled participants had been entered into a care coordination registry, and registry entries had been reviewed for accuracy and updates on a quarterly basis. But fewer than half of the participants had an access plan (49 percent), and fewer than half of the baseline participants had a completed and updated care plan (46 percent).

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories:

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The awardee and site leaders discussed one primary intervention characteristic that facilitated implementation: alignment with existing hospital-based programs for CMC and existing care coordination efforts in hospitals and primary care practices. The CARE program was based on care processes that have been promoted for CMC for many years. Thus, some processes had already been incorporated into or proposed for many of the hospital-based outpatient CMC programs that were participating in the cooperative agreement. Site leaders noted that the cooperative agreement has pushed the hospital-based programs and primary care practices to implement the processes in a more comprehensive and consistent manner and to measure and track their progress by using principles of quality improvement.

Some site leaders described challenges with the design of the intervention related to (1) the limited involvement of clinical leaders and frontline staff in the early design and application process and (2) the need to make care processes specific but flexible enough for the unique environments of each participating hospital and primary care practice. In some cases, the application process was driven primarily by hospital executives, while the individuals implementing the program at the site level were not involved. Thus, the site leaders and staff were unable to point out inaccurate assumptions about the time and level of effort needed to engage hospital-based CMC programs and primary care practices and to implement changes in care processes. Although the awardee had proposed care processes in its application, site leaders reported that these processes had not been refined to the level of specificity needed for implementation. The development of these processes required most of the first year of the cooperative agreement to complete, delaying full implementation into the second year.

> "We were supposed to have all of the interventions in place ready to go a year ago, and we hadn't designed what a care plan looked like yet. We didn't walk into this with a design of what a dynamic CARE team looked like. . . . The change package existed in theory, but it didn't exist at a granular level that could be useful for practices. We had to build all of that."
>
> *— Hospital site leader*

2. Implementation processes

Awardee and site leaders described a focus on measuring and reporting care processes as a primary barrier in the implementation process and a distraction from the overall goals of the CARE program to improve care and health for CMC. The site leaders described the need to intermittently remind staff that the processes and measurement approaches were intended to support the overall program goals and provide feedback to awardee leaders when these processes and approaches were impeding care.

> "The biggest complaints I have had from folks on the ground [have] been, 'Too much red tape, now we've got to spend more [time on] paperwork to say how this test changes.' It's a lot of paperwork. That is absolutely preventing the direct care."
>
> *— Hospital site leader*

Awardee and site leaders noted two primary facilitators to implementation: (1) an emphasis on peer-to-peer learning in the learning collaborative sessions and (2) the awardee leadership's flexibility and adaptability. Several site leaders noted that a major facilitator that had helped address barriers was a greater emphasis on peer-to-peer learning during the learning collaborative sessions, with fewer presentations from experts who were not directly involved in the implementation of the program.

Site leaders also described awardee leaders' flexibility and willingness to adapt to the sites' needs as a major facilitator of implementation. Site leaders said this had led to expectations that they felt were more realistic in the time frame of the cooperative agreement. Awardee

> "I think that the collaborative, too, in terms of sharing information has also picked up in terms of the cross-pollinating of ideas between the different programs so that it doesn't feel as daunting of a task to make some of the changes, because other programs are thinking of things or approaching things in a different way that then give you an idea of how [to] make [it] work at your institution."
>
> *— Hospital site leader*

leaders also discussed the importance of being able to adapt the interventions to the specific context of each site.

3. Organizational and external context

CARE program leaders described three organizational characteristics that were primary facilitators to implementation: (1) engagement by hospital executives, (2) compatibility of the program with pre-existing organizational priorities targeting CMC, and (3) primary care practices owned by the hospital's health system. First, site leaders described how involvement of their organization's chief executive in the application process as well as ongoing engagement with the CARE program's learning collaborative has helped support their work and promoted integration of the CARE program into their organization's overall priorities and strategies. The site leaders noted that the involvement of hospital executives has maintained the visibility of the program and directly provided substantial in-kind support, such as additional staff and prioritization of needed changes to electronic medical records.

Second, awardee and site leaders agreed that the CARE program aligned well with pre-existing programs and priorities that were targeting CMCs at the sites. Nine of the ten implementation sites already had hospital-based programs targeting CMC, and several had been exploring opportunities to engage with primary care practices to support the care of CMC in the community.

> "We didn't really have to convince anybody that this was a good idea, that this was something we should do. It was something we were doing, and we approached participation in the award much more like, how does this advance our knowledge, accelerate our learning and our evolution?"
>
> *— Hospital site leader*

Third, awardee and site leaders noted that having a network of owned primary care practices was a major facilitator for implementation of the program. Owned primary care practices were already largely aligned with an organization's priorities, so they required less time and effort to recruit. Hospital executives also had the ability to influence these practices' decisions and provide direct support of implementation through staffing and other resource decisions.

CARE program and site leaders also described two major external facilitators: (1) alignment of the goals of the program with other programs in the state and (2) the proposed movement of CMC into Medicaid managed care. The interviewees noted several examples where the CARE program aligned well with other initiatives occurring in their states, including implementation of the patient-centered medical home model in primary care, accountable care and population health models for health systems, Delivery System Reform Incentive Payment programs in Medicaid, and State Innovation Model grants from CMMI. A few site leaders noted that although CMC have historically been kept in Medicaid fee-for-service (FFS) programs, their state Medicaid agencies have been planning to or have started to move CMC into Medicaid managed care, which provides additional incentives to the state and managed care organizations to support programs like the CARE program.

Two major external barriers were noted by awardee and site leaders: (1) a primarily FFS payment environment and (2) access to and timeliness of Medicaid data. First, interviewees noted that most payment arrangements in Medicaid and commercial insurance are still based on FFS; this is a disincentive to health systems and primary care practices to participate in programs

like the CARE program because much of the work is not billable. One site leader noted that many independent primary care practices that the hospital attempted to recruit were reluctant or unwilling to participate because their business models depended upon time spent on billable services.

Second, all the site and awardee leaders noted the challenges presented by Medicaid data for implementation of a program like the CARE program. The time required to negotiate access to and then process Medicaid data was not conducive to using the data as the primary source for recruitment of participants. Delays in Medicaid data reporting and processing, and challenges with data quality also limited the utility of the data for monitoring program improvements in care and utilization. In addition, some states and Medicaid managed care organizations were only willing to provide data for children enrolled in the program or a limited comparison population—which limited the sites' abilities to compare improvements in outcomes with similar children who were not enrolled in the program. A few sites that had strong relationships with Medicaid managed care organizations through accountable care arrangements were able to obtain data more quickly, but they still faced the other challenges with the data.

C. Development of the payment model

At the time of our interviews in June 2016, three sites had signed new payment agreements, and one site expected to sign agreements in the second half of 2016 (Table 2). As more Medicaid claims and cost data become available to the awardee, these sites plan to evaluate the payment models and potentially negotiate for modifications. The remaining six sites were still in the process of developing a payment model to propose to their payers.

Table 2. Status of development and negotiation of payment models by National Association of Children's Hospitals and Related Institutions HCIA R2 implementing sites

Awardee site	Proposed payment model	Payer	Stage of development
Mattel Children's Hospital	To be determined (TBD)	Medicaid agency	In development
Lucile Packard Children's Hospital	Care management fee plus shared savings	Medicaid managed care plan	In development
Children's Hospital Colorado	Shared savings or partial capitation	Medicaid agency and Medicaid accountable care entity	In development
Children's National Medical Center	TBD	Medicaid managed care plan	In development
Wolfson Children's Hospital	TBD	Medicaid agency	In development
St. Joseph's Children's Hospital	Per beneficiary per month (PBPM) care management fee	Medicaid managed care plan	Effective July 2016

Table 2 *(continued)*

Awardee site	Proposed payment model	Payer	Stage of development
Children's Mercy Hospital and Clinics	PBPM care management fee	Medicaid agency (health homes program)	Effective October 2016
Cincinnati Children's Hospital Medical Center	TBD	Medicaid agency	In development
The Children's Hospital of Philadelphia	Upfront funding of pilot program	Medicaid managed care plan	In negotiation
Cook Children's Health Care System	Shared savings	Medicaid managed care plan	Effective February 2016

Source: Reports submitted by the awardee to the implementation and monitoring contractor and interviews with awardee and site leaders in June 2016.

Awardee and site leaders discussed three primary facilitators to negotiating and implementing payment models: (1) early and ongoing discussions with payers, (2) alignment of the program with other payment models in the state, and (3) availability of data to compare across sites. First, most awardee sites had begun preliminary discussions with payers during the HCIA R2 application process; they have continued these discussions since that time. Second, several sites have found that the CARE program fits well with other payment reform efforts in their states—including, transitions of children with special health care needs from Medicaid into managed care, Medicaid health homes programs, and Medicaid accountable care programs. This has facilitated discussions to include in those state programs children who are eligible for the CARE program. Third, the awardee has been able to obtain Medicaid claims data for 9 of the 10 participating sites, which has allowed its actuarial consultant to provide some comparative data on utilization and costs across sites.

Awardee and site leaders described two primary barriers to negotiating and implementing payment models: (1) Medicaid data limitations and (2) the time needed to negotiate new payment agreements. First, sites have been able to negotiate access to Medicaid data that is often limited to the children enrolled in the program, with limited or no population of comparable children who were not enrolled in the program. Program and site leaders have noted in prior interviews that this is often driven by payer concerns about anticompetitive risks of providing data that includes other provider groups, especially when cost data are included. This has limited the ability of sites and the actuarial consultant to understand how the complexity of conditions, utilization, and costs for children in the program compare to children outside the program, in order to estimate potential or realized cost savings. Second, a few sites noted that potential payer partners have been hesitant about new payment models for this population without seeing evidence of impacts. The site leaders felt it is unrealistic to generate information on program impacts and negotiate a new payment model based on those impacts within the three years of the cooperative agreement.

IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 3: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 3. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: National Association of Children's Hospitals and Related Institutions

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	13,686
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	4,660
Likelihood of all-cause hospitalizations	580
MDE sample size requirement to detect 20% effect	
Total expenditures	1,165
Likelihood of all-cause hospitalizations	145
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group; patient self-selection high/high refusal rate
Full implementation of new intervention	Questionable, cannot identify degree/intensity of intervention
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	None
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We will be able to produce a rigorous impact evaluation of the effects of the CARE program on health care utilization. We will match children in the intervention program from each hospital to a group of comparison children in the same state with similar demographic and diagnostic characteristics and similar health care utilization patterns in the year prior to enrollment. Our current sample sizes should be large enough to detect plausible effects of the program, though it is possible that lags in Medicaid data in some states could prevent us from doing an analysis of beneficiaries from some of the participating hospitals.

V. NEXT STEPS

A. Implementation evaluation

As the National Association of Children's Hospitals and Related Institutions enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

To date, the absence of Medicaid administrative data has delayed the impact evaluation of the CARE program. However, the CMS Virtual Research Data Center now contains Medicaid data that are recent enough for us to begin analyzing baseline characteristics for children in one of the 10 participating hospitals: Children's Mercy Hospital in Kansas City, Missouri. For this hospital, we have identified nearly all program enrollees in the Medicaid data, and we have access to the enrollees' claims through the third quarter of 2015, which includes the program launch date. This group of children represents nearly 20 percent of all CARE enrollees. For the remaining nine hospitals, we cannot calculate baseline characteristics because the data for the baseline period are not yet available and/or because there are few linkages between the finder file and the CMS administrative data.

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APPENDIX B.22.

NATIONAL HEALTH CARE FOR THE HOMELESS COUNCIL

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MATHEMATICA Policy Research

REPORT

APPENDIX B.22

HCIA Round Two Evaluation: National Health Care for the Homeless Council

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Medical Respite Care for People Experiencing Homelessness program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress of the National Health Care for the Homeless Council in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has National Health Care for the Homeless made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has National Health Care for the Homeless and its five sites addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of National Health Care for the Homeless' Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Medical Respite Care for People Experiencing Homelessness program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

National Health Care for the Homeless received an HCIA R2 award to support the intervention, Medical Respite Care for People Experiencing Homelessness, which implemented delivery and tracking of standardized, evidence-based respite care services for existing respite care programs in five sites. Medical respite care is defined as acute and post-acute medical care provided to homeless individuals who are not ill enough to be in a hospital but who are too ill to recover from a physical illness or injury on the streets.[2] To implement protocols for delivering standardized respite care services and track adherence to those protocols, National Health Care for the Homeless partnered with five sites that provided respite care prior to the HCIA R2 cooperative agreement: (1) Edward Thomas House in Seattle, Washington; (2) Hennepin County Health Care for the Homeless and Catholic Charities in Minneapolis, Minnesota; (3) Central City Concern in Portland, Oregon; (4) Circle the City in Phoenix, Arizona; and (5) Columbus House in New Haven, Connecticut.

To be eligible for the National Health Care for the Homeless intervention, patients must (1) be eligible for care in one of the five respite care programs and (2) consent to have their data tracked for the duration of the intervention. To be eligible for care in a respite care program at one of the five sites, individuals must be age 18 or older; acutely ill; and at high risk of being readmitted to a hospital if they return to their former living arrangement, which may be the street. In addition, individuals must be able to carry out activities of daily living and be cognitively able to consent, meaning that they are not impaired by severe mental illness or substance abuse.[3] National Health Care for the Homeless anticipates the majority of the population served will be Medicaid beneficiaries, with a smaller fraction being Medicare beneficiaries and dually eligible individuals.

All five sites implemented the standardized respite care model in order to deliver services representing recognized best practices in the field of respite care. To monitor implementation progress, sites collected respite care delivery data on patients who consented to be part of the intervention, and reported the information to National Health Care for the Homeless by using a data aggregation tool. The model includes three core respite care services:

1. **Care management**, which includes medication monitoring, case management, and prevention efforts such as tobacco cessation and influenza vaccination, as well as the establishment of a medical clearance date—a date when a medical doctor who provides care for a patient considers a patient's health stabilized.
2. **Patient engagement**, which primarily involves motivational interviewing and patient education to give patients the resources and confidence needed to set goals for managing their own health.

[2] See National Health Care for the Homeless Council. "What is Medical Respite Care?" Available at https://www.nhchc.org/resources/clinical/medical-respite/.

[3] The five sites provide respite care to patients who meet the eligibility criteria regardless of whether they consent to have their data tracked for the National Health Care for the Homeless intervention.

3. **Transitional care**, which is intended to establish and solidify a primary care provider to address patient care needs. This is accomplished by providing the patient and primary care provider with updated health care information and by arranging follow-up primary care appointments at 7 and 30 days after a hospital discharge.

Respite care staff such as social workers, mental health providers, nurse care managers, and pharmacists delivered the standardized, evidence-based respite care services. Data managers worked with clinical staff to ensure that the electronic or paper data collection forms used to track each of the services were routinely and accurately completed by all sites. Data managers then entered all data collection forms into an electronic data aggregation tool and submitted this to National Health Care for the Homeless for analysis across sites. See Table 1 for a description of the overall program.

Table 1. National Health Care for the Homeless: Medical Respite Care for People Experiencing Homelessness characteristics at a glance

Program characteristic	Description
Purpose	Establishing a standardized model of respite care by consistently providing and tracking the delivery of three core services: (1) care management, (2) patient engagement, and (3) transitional care coordination in a setting that is safe for patients
Components	• Care management. Assesses patients' needs and aligns resources to support their recovery and health • Patient engagement. Assists patients in self-management goal setting and care plans; reassesses goals and plans to empower patients to better manage their health • Transitional care coordination. Helps patients establish a care team of providers and follow-up appointments after being discharged from a hospital or other medical facility
Target population	The program focuses on people age 18 or older who are experiencing homelessness and who have an acute illness or injury. Patients will have already been admitted to medical respite care. Medical respite care patients are considered a high-risk, high-cost, underserved population. Most of the patients qualify for or are enrolled in Medicaid. Staff begin the enrollment process for those who qualify for but are not yet enrolled in Medicaid. A smaller percentage are Medicare beneficiaries or dually eligible.
Theory of change/theory of action	An increase in access to respite care after a hospitalization for an acute injury or illness will lead to better management of chronic conditions, increased use of preventive services, and fewer ED visits. Providing care management specific to the needs of persons experiencing homelessness (called self-management goal setting) will result in better health outcomes, fewer ED visits, and lower health care costs.
Payment model	New fee-for-service (FFS) payment, value-based payments, shared savings, bundled or episode payment
Award amount	$2,673,476
Launch date[a]	March 2, 2015
Setting	Medical respite care service programs
Market area	Urban
Market location	City

Table 1 *(continued)*

Program characteristic	Description
Outcomes	• Patient adherence to prescribed medications • Patient understanding of treatment plan • Patient self-management of chronic conditions • Increase in smoking cessation • Increase in number who receive vaccinations as recommended • Increase in linkages with social services • Improvement in care coordination • Decrease in hospital utilization and costs

[a] After the initial planning period, the awardee's program began to operate as of this date.
ED = emergency department

The five respite care programs currently receive payment for respite care services by at least one of the following types of payers: (1) a Medicaid-contracted managed care organization (MCO), (2) a Medicaid-contracted accountable care organization (ACO), (3) a Medicare-contracted ACO, (4) a state Medicaid agency, or (5) a federally qualified health center (FQHC) Medicaid Prospective Payment System (PPS). The payers at each site utilize various approaches to pay for respite care services, such as bundled and value-based payments at one site or a monthly flat rate per beneficiary for services at another site. The five aforementioned payers do not cover all the costs associated with providing respite care services; thus, each site receives additional grant funding. At least two sites receive payments from referring hospitals. Because each site has different payers and payment approaches, National Health Care for the Homeless focused on collecting cost data and lessons learned from sites implementing various payment models to facilitate national discussions among respite care leaders and payers, and to share viable reimbursement mechanisms with current and future respite care providers.

National Health Care for the Homeless originally intended to serve 4,039 participants by the end of the three-year cooperative agreement; the figure was revised to 3,128 participants in August 2015 to more accurately reflect the number of people the awardee plans to serve. The awardee expects consistent delivery and tracking of the three standardized, evidence-based services to reduce emergency department (ED) use and hospital readmissions. National Health Care for the Homeless' goals for its target population are to (1) reduce all-cause ED visits by 20 percent at 12 months post-intervention, index hospital length of stay by 30 percent, and all-cause readmissions by 30 percent at 12 months post-intervention; (2) increase the proportion of patients receiving preventive care; and (3) reduce hospital inpatient costs by 30 percent and ED costs by 20 percent at 12 months post-intervention.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by National Health Care for the Homeless during the first year of its cooperative agreement.

- National Health Care for the Homeless developed policies for patient-centered care, flu vaccinations, and tobacco cessation at participating respite care sites to standardize services.
- Respite care staff developed workflow processes to collect data to measure utilization of transitional care coordination, patient engagement, and care management.

We also identified several initial challenges in implementing the program and the strategies that National Health Care for the Homeless used to address them.

- Some patients resisted engaging in self-management goal setting (for example, they would not engage with the care manager or complete surveys). Sites adjusted their workflow processes to engage individuals earlier during their respite care stay.
- Of the five sites, three sites began to enroll individuals in the first program year. Two of the three sites initiated enrollment as planned; the third site was delayed by institutional review board challenges. The other two sites that did not initiate enrollment as planned were scheduled to begin enrollment in the second year of the program.

Finally, we identified several early lessons learned by National Health Care for the Homeless in implementing its program.

- To implement the awardee's standardized respite care delivery model, it was vital to also implement standardized data collection procedures.
- Changes to workflow might be necessary to increase staff ability to gather all data elements related to the respite care model, such as patient satisfaction surveys.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, National Health Care for the Homeless made progress in the following areas:

- Sites continued to work with hospitals, local shelters, and community outreach partners to recruit eligible individuals as patients in medical respite care. All sites asked patients for consent to have their patient data collected to participate in the intervention. Staff at all sites used their knowledge of the homeless population to improve the consent process and incrementally increase enrollment.
- Sites refined their workflow processes and improved communication internally with staff and externally with hospitals and provider groups to increase their capacity to collect, track, and analyze standardized respite care measures for participants.
- Sites improved their staff capacity and skill set to engage respite care patients. Additional clinical staff at some sites, motivational interview training, and routine solicitation of patient feedback supported these improvements.

Over the past year, National Health Care for the Homeless also made one key change to its program:

- National Health Care for the Homeless reduced data manager burden by finalizing the main data aggregation tool used to track adherence to the intervention. Formerly, the project director frequently revised the data aggregation tool in response to feedback from data managers at all five sites. These revisions required continuous adaptation of data management processes at each of the sites, which became burdensome. All sites are now using the finalized tool.

Below we note the key challenges that National Health Care for the Homeless has addressed in the second year of its cooperative agreement.

- All five sites experienced lower-than-expected enrollment due to longer-than-anticipated stays among the respite care patients. Additional barriers to enrollment included the following: the program launch was delayed in two sites, and another site experienced delays in hiring staff. To address these challenges, sites attempted to increase program participation by adapting the patient consent protocol to better address the needs and concerns of the target population.
- Due to communication challenges with partner hospitals, several sites continued to have missing and incomplete access to patient health records. To address this challenge, sites strengthened communications with their hospital data contacts; repeated requests for data; and educated partner hospitals about the importance of getting complete, accurate, and timely data.

As National Health Care for the Homeless enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- National Health Care for the Homeless leaders are anticipating challenges related to developing a cost-per-respite care service. The leaders, however, have found it difficult to find similarities across sites, given the variation in payment mechanisms and state policies. To address this challenge, National Health Care for the Homeless is collecting cost data and lessons learned from all sites' payment models to communicate the value of respite care to current and future payers.
- National Health Care for the Homeless supports a multiple-payer payment model that (1) builds off existing payment models already used across sites and (2) is based on a site's clinical service capacity and policies with the state Medicaid agency. Payments received from current payers will allow each of the sites to continue operating their respite care programs after HCIA R2 funding ends.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by National Health Care for the Homeless in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 through June 22, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct 11 telephone interviews, which lasted from 30 to 60 minutes each, with the following program staff:

- Project director at National Health Care for the Homeless
- Program leader at one site
- Data managers at all five sites
- Three clinical staff at three individual sites
- Consultant to National Health Care for the Homeless

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the awardee's implementation progress during the second program year, as well as a description of the factors that facilitated or hindered this progress, including program changes.

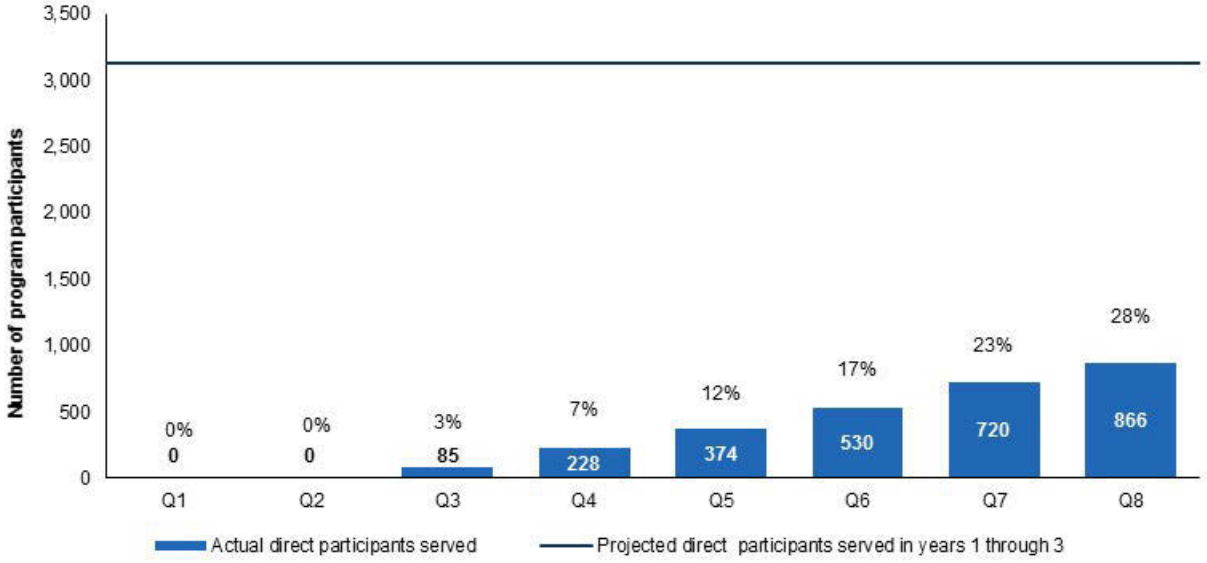
[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Participants are medical respite care patients with an acute illness or injury who are age 18 or older and homeless. Participants will have already been admitted to medical respite care and consented to participate in the intervention, which tracks their patient data. Medical respite care patients are considered a high-risk, high-cost, underserved population. Our discussion on enrollment focuses on both the high acuity of this population and the number of enrolled participants.

National Health Care for the Homeless reported to the implementation and monitoring contractor that it served 866 participants from March 2015 (when it launched its program) through August 2016, which represents about 28 percent of its 3,128 projected direct participants (Figure 1). Interview respondents' attributed this lower-than-expected enrollment to delayed program launches at two sites in and delayed hiring at another site in Year 1, but primarily to participants' high acuity, increased length of stay in respite care, and corresponding lack of available beds for new participants.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. NHCHC does not have indirect program participants.

The progress that National Health Care for the Homeless has made in meeting its three-year enrollment goal was influenced by two key factors: (1) delays in obtaining IRB clearance and the necessary staffing, and (2) a longer-than-anticipated average length of stay.

Several sites experienced delays in obtaining IRB clearance and the necessary staffing to enroll and obtain consent from patients. For example, the state IRB process at one site was more rigorous than expected, which delayed the launch by four months. Another site was delayed in hiring a RN case manager, who provided medical consultation during the enrollment process, until several months after program launch. The delays in hiring key staff curtailed the ability of several sites to efficiently enroll and obtain consent from patients.

The average length of a respite care stay for high-acuity participants was longer than anticipated, which limited the number of new patients that could be enrolled at some sites. The average length of stay across sites increased from 38 days in November 2015 to 49 days in August 2016. Because the length of stay was greater than anticipated, and because the sites could not make more beds available, they worked with hospitals to ensure that once a bed was vacated, another eligible person would fill it. To do this, sites educated hospitals and partners about the value of respite care and the types of patients that are good candidates for respite care. Another strategy was to maximize the proportion of patients receiving respite care who consented to participate in the intervention. For example, one site made more staff members available to take patients through the consent process in order to close the gap between the total population of patients receiving respite care and those agreeing to have their care tracked as part of the innovation.

B. Implementation of the service delivery model

In the second year of the cooperative agreement, all five sites refined their workflow processes to fully implement the standardized respite care model and to document patients' respite care services. All sites successfully deployed collaborative, multidisciplinary care teams and improved staff confidence in terms of engaging patients and providing patient-centered care. New staff were integrated into the intervention at each site. This process was supported by improved internal communication regarding completion and accuracy of data collection on care delivery within the standardized respite care model. In addition, all sites worked to improve communication with partnering hospitals to ensure access to timely, accurate patient data. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Providing additional staffing capacity helped to facilitate program implementation. By enabling sites to hire additional clinical staff, the cooperative agreement facilitated multidisciplinary teamwork in the respite care setting. All sites hired a non-clinical data manager to implement the intervention, whose primary role was to collect and track the delivery of standardized respite care services. Sites were not restricted on the clinical staff they could hire, but most sites hired care managers and social workers to carry out the intervention alongside existing respite care staff. For example, one site hired a pharmacist to handle patients' medication management while another site hired a social worker with mental health expertise. Although all five sites previously provided respite care, they were somewhat restricted in the services they were able to provide to patients because of the limited range of staff types employed. Under the cooperative agreement, sites introduced new staff who expanded services for patients and provided new approaches to care. For example, a new care manager at one site offered trainings in wound care, a skill relevant to caring for the homeless population. At another site, the new social worker was particularly effective at community outreach for enrollment, while a part-time pharmacist helped patients better manage their medications.

> "All of us being on the same page . . . has helped everyone know what the study's about, why it's important, why we're collecting information, which has made a difference, versus just a few people explaining, we're just collecting information because this is what we're doing. That's helped a lot of people's understanding of . . . how everyone's role is important."
>
> *— Data manager*

National Health Care for the Homeless sites standardized protocols and tailored workflow processes to optimize the delivery of high quality respite care services. Prior to the cooperative agreement, sites were not providing core respite care services in a standardized way, such as offering flu shots to every patient. Since the cooperative agreement was implemented, data managers at each site began conducting routine meetings with key staff, including clinicians from partnering FQHCs, to foster communication, including discussing the development of protocols and workflow processes for providing standardized respite care services. Data managers at each site used the newly developed data aggregation tool to collect and report on specific respite care services. Because data managers do not deliver the respite care services, they used this tool to make sure that case managers and other clinical providers were capturing data from patients at appropriate points during their respite care stay. Although the method of capturing data on patient care varied at each site (from electronic medical records [EMRs] to hard copy Excel sheets), every site held staff members accountable for collecting patient data before the patients were discharged.

Staff also developed confidence in new skills such as motivational interviewing, which helps staff build trusting relationships with patients. The encounters around goal setting helped staff become more aware of the comprehensive patient experience—their concerns, fears, and vulnerabilities. Furthermore, goal setting through motivational interviewing not only helped staff to develop an individual care plan for each participant; it also helped participants to set more achievable goals for improving their health. Several staff across all sites noted that motivational interviewing was easily implemented and a helpful new skill.

2. Implementation processes

During the second program year, National Health Care for the Homeless and its five sites focused on the consistent delivery and tracking of respite care services, building patient trust, and improving coordination for data collection among staff and with partners.

All the sites partnering with National Health Care for the Homeless on the HCIA R2 cooperative agreement already had medical respite care programs. However, these programs did not use a common standard for respite care and did not incorporate the full range of recognized best practices in respite care. This meant that respite care was not an easily defined service for the purposes of reimbursement and sites could not easily measure the quality of their care. To address this challenge, National Health Care for the Homeless needed its partner sites to implement the standardized respite care model and to accurately and consistently track data on the delivery of these respite care services. Furthermore, the awardee needed to gather data from all five sites in a format conducive to a cross-site analysis.

> "[Respite care staff] really focus on building rapport. I think the way that we approach clients—in terms of being respectful and offering multiple opportunities and not giving up on them—gives the chance for that engagement to occur."
>
> *— Nurse care manager*

The extent of the modifications in delivering respite care services varied across sites, but the main additions were (1) motivational interviewing, (2) smoking cessation services and flu shots, (3) medication management, (4) collection of patient feedback, and (5) follow-up appointments for patients with primary care physicians at 7 days and 30 days after hospital discharge. For example, sites participating in the intervention established standard protocols for asking every patient about whether or not they had received a flu shot. Prior to the cooperative agreement, a process for this was not in place at every site, which meant not all patients had access to a flu shot. Documenting the delivery of respite care services, such as the flu shot, reinforced this change in clinical practice and prompted data managers to hold clinical staff accountable for providing the service to every patient. Ensuring that all patients had flu shots was a relatively simple best practice to implement.

Respite care staff were keenly aware of patients' fear of and skepticism toward medical professionals. Several staff interviewed recounted the need to take great care and problem solve in order to gain patient trust. The "medical hospitality" approach one staff member described allowed patients to develop a relationship with the health care providers and support staff. One nurse care manager, who saw her role as a "medical liaison and advocate" for patients, noted that promoting engagement was done on a daily basis through conversations with patients. One site used the strategy of building on success. For example, if a patient had not smoked in two weeks due to a nicotine patch, staff encouraged the patient to continue that tobacco cessation strategy. Another site worked to increase the number of clinical staff so that patients could be seen at least every other day in order to closely monitor the patients' care. By engaging patients through a "medical hospitality" approach, respite staff gave patients a participatory role in their health care, which fostered independence and responsibility for taking better care of their health in the future.

Staff also incorporated their understanding of the homeless population into their protocols to improve rates of consent to participate in the intervention. Instead of approaching individuals for consent on the same day that they began receiving care at their facility, several sites gave patients at least a few days in respite care before engaging them in the consent process. Staff found that participants who were not fully committed to engaging in the intervention generally left respite care entirely before the consent process, and the patients who remained were less likely to feel overwhelmed or suspicious of the information being requested of them. For at least one site, the newly implemented protocol of waiting a few days before starting the consent process helped to increase the number of patients who agreed to participate in the intervention. Sites prioritized making patients feel that they could trust staff members responsible for the intake of new patients. At one site, this meant having the same person who conducted intake also obtain patient consent. At another site, the staff member responsible for the consent process framed participation as an opportunity for patients to improve respite care for themselves and others who go through the program. Staff ultimately needed to be prepared to communicate and work effectively with all participants in the care process—from the patients receiving care to the hospitals from which they were discharged.

> "And the whole focus is on that individual—what they're bringing to us, in terms of why they initially came to us, how they can enrich their experience by helping others. By others, what I mean by that is their story, the data they could provide for us, which would help another patient come into respite in the future."
>
> *— Mental health provider*

All sites experienced a learning curve related to working with hospitals to receive EMR data, especially discharge data, on respite care patients. Sites without EMR systems that linked to partner hospitals needed to send those hospitals a list of respite care patients and the requested data fields—such as hospital stay, length of stay, and diagnosis codes. Data from hospitals was not always complete or comprehensive, which required repeated requests and ongoing communication to reinforce the importance of sharing data with the respite care centers. Sites found that they could access patient data by using certain networks and organizational structures. For example, because one site was part of an ACO, it had access to state Medicaid data directly, which allowed the site to bypass hospital-specific data delays. In some cases, delays were unavoidable. For example, two states were experiencing delays in receiving Medicaid data as of the end of August 2016. Patient health records from hospitals and state Medicaid agencies continue to be important, as they complement the data generated by the sites on characteristics such as patient confidence in goal setting and the number of patients offered tobacco cessation support.

In a process often led by the data manager, staff at each site coordinated to establish processes for accurately and completely reporting data on the delivery of the respite care model to National Health Care for the Homeless. A data manager at one site created a checklist that served as the cover page for patient records. It lists all the data that the patient navigator needs to enter prior to patient discharge. In addition, several sites established that all completed survey data should be handed off to the data manager to record and check for quality. Once the patient health records and information on respite care provided were sufficiently documented, data managers across all sites used a common format to report these data to National Health Care for the Homeless.

Standardizing data collection in respite care may have been helpful for analysis at the awardee level, but could be time-consuming for individual sites and program leaders. National Health Care for the Homeless revised the data aggregation tool approximately 27 times to accommodate data manager input and maintain consistent reporting processes across sites. This process proved burdensome both to the project director and the data managers, who had to repeatedly adapt their workflows. National Health Care for the Homeless ultimately stopped making these revisions. However, data managers may still need to engage in double data entry or pull data from multiple sources for the data aggregation tool. Data managers were expected to orchestrate the collection, submission, and analysis of data on care delivery, but this role did not necessarily match the skill set of data managers at every site.

To gather patient data from all five sites and analyze their implementation progress as well as the value of the standardized model itself, the awardee needed to further refine the roles and responsibilities of the data managers. A data manager's skill set and actual responsibilities within the data analysis team were not well understood. For instance, there was a lack of consensus on the extent to which the data managers, as opposed to analytic staff at National Health Care for the Homeless, were expected to clean the data. Although one data manager with a computer programming background was well suited to the task of supporting data analysis, those skills were not shared by the other data managers. Due to the lack of clarity in the data manager role, National Health Care for the Homeless conducted in-person site visits and provided more guidance during monthly data manager calls.

3. Organizational and external context

During the second program year, National Health Care for the Homeless continued to work with partner hospitals to refine EMR access in order to track respite care services. Access to EMRs enabled sites to efficiently track the delivery of the standardized medical respite care services. Four of the five sites have access to either an EMR that is linked to at least one partner hospital or a stand-alone EMR that is not linked to a partner hospital. The only site without access to an EMR is a site with only 12 beds that works closely with its partner hospital and a statewide homeless database. Although several data managers noted a significant learning curve for integrating the tracking tool into their EMR, all data managers were able to electronically streamline their processes for tracking services. For example, sites that had an EMR linked to a hospital partner could easily identify patients and collect discharge data. Sites with stand-alone EMRs had more ownership to tailor their EMR databases. For example, when the data managers were revising the tracking tool to include new data fields such as gender, sites with a stand-alone EMR could easily make this change while sites with an EMR linked to a hospital could not due to their lack of EMR ownership. Even though the level of access to and flexibility with the data varied, all sites with an EMR had greater capacity to track medical respite care services.

> "I wish I would've really emphasized the role [of] the data managers as part of the larger data analysis team. And then I think I would have probably been a little bit more formal about the project lead divisions."
>
> *— Project leader*

Contextual factors of respite care programs influenced the types of patients who were able to receive respite care services and subsequently consent to have their data tracked. Many patients who need respite care services are active drug users or have mental health conditions. Following

"harm reduction" principles, some sites allowed patients to use substances off-site. Other sites did not allow patients to use drugs at all while in the program. Harm reduction sites believe allowing substance use off-site encourages patients to stay in the program. All sites attempted to obtain informed consent from patients with mental health conditions, but this was sometimes difficult given their mental health or drug-related impairments. To address this, staff tried to obtain informed consent when potential participants were less likely to be under the influence. At least one site changed its staffing schedule so that staff had more opportunities to get informed consent during the day and night.

C. Development of the payment model

National Health Care for the Homeless provides cost analysis and leadership support to sites as they continue to develop and implement a multiple-payer payment model that builds on existing multiple-payer and single-payer models. The five sites' payment models vary by payer, payment approach, and additional funding streams, primarily because each site offers different clinical services and has different policies in place with its state Medicaid agency. Each site currently reimburses clinical providers for providing respite care services to patients. Because the sites' clinical capacity to provide respite services varies, sites' payment models are categorized in the following two ways: (1) as a site affiliated with an FQHC or (2) as a site affiliated with health care providers who are not part of an FQHC. Within each payment model category, different Medicaid-contracted and Medicare-contracted payers exist that utilize different payment approaches.

- **Three sites affiliated with an FQHC.** Two sites receive payments for primary care encounters and respite care services at their affiliated FQHCs through an enhanced PPS rate from the state Medicaid agency. Two FQHC-affiliated sites receive additional payments for respite care services through Medicaid-contracted MCO agreements. One site contracts with nine MCOs and receives payment for respite care services through bundled and value-based payment mechanisms, and the other site receives payment from a single MCO through a value-based payment mechanism. This MCO caps payment at 15 patients per 30 days, with the possibility of requesting additional payment if a patient stays longer than 30 days. The third site's FQHC receives a flat monthly rate payment per beneficiary for clinical and supportive services provided via a Medicaid- and Medicare-contracted ACO.

> All sites have a "huge variety of buckets, as far as technical capacity or even health care billing capacity."
>
> — *Site project lead*

- **Two sites not affiliated with an FQHC.** One site has four Medicaid-contracted MCO agreements and receives payment for respite care services through a value-based payment mechanism. The remaining site contracts with a visiting nurse program, which receives fee-for-service (FFS) payments for respite care services from the Medicaid state agency.

Respite care services and operational expenses such as staff time used towards patient engagement are not covered by the five payers; the sites therefore also receive additional funding from grants, foundations, and partnering hospitals. Each site receives grant or foundation funding, but two sites receive hospital funding for eligible respite care patients to be discharged from hospital to respite care. For these two sites, partnering hospitals can pay for a block of beds based on costs associated with those beds per night. Typically, hospitals are the first to engage

with respite care centers in a payment arrangement because they can gain the most savings. However, as both of these sites experience an increase in MCO agreements, their hospital partners may become reluctant to continue to pay for services. Hospital funding was a primary funding stream for both of these sites prior to the cooperative agreement. National Health Care for the Homeless is working with these sites to communicate the value of respite care to their hospital partners in hopes of sustaining this funding.

Payments received from each site's current payers and additional funding from grants, foundations, or hospitals will allow each of the sites to continue operating after HCIA R2 funding ends. Although many of these payment approaches existed prior to the cooperative agreement, they did not fully cover respite care costs; thus, National Health Care for the Homeless has been providing technical assistance to help sites establish the payment approach that works best for them and their partnering hospitals. Furthermore, National Health Care for the Homeless collects lessons learned from implementing these various payment models as the basis for facilitating national discussions among respite care leaders and sharing viable reimbursement mechanisms for respite care with other respite care providers.

Regardless of the payer type, the awardee is working towards determining a cost per service so that sites could negotiate a payment amount with a payer. All sites, however, are structured differently, which impacts sites' costs to provide respite care services and makes it less clear what appropriate costs are for these services. For example, the sites that are affiliated with a public entity, such as a government-owned homeless shelter, may have fewer costs due to shared resources with the shelter than a privately owned and operated facility. Finding commonalities across sites was challenging given the different payment mechanisms and state policies. To address this challenge, National Health Care for the Homeless is collecting cost data and lessons learned from all sites' payment models to communicate the value of respite care to payers and create a shared understanding of the costs associated with providing standardized respite care services.

Several sites that partner with MCOs have had challenges establishing payments for respite care services. Typically, MCOs contract for a specific number of beds and the contract is based on a cost per month for each bed. National Health Care for the Homeless has not yet determined a per night cost for respite care services across the five sites due to the varying levels of clinical and non-clinical care capacity as well as the lack of a counterfactual for comparison. Without a standardized cost that respite care programs can present to MCOs for the value of their services, it is difficult for sites to know the appropriate level of reimbursement when trying to partner with MCOs. The lack of a standardized cost also means that one site can have a variety of different MCO contracts that cover different services at varying payment levels. Furthermore, MCOs' nondisclosure agreements do not allow National Health Care for the Homeless to know which services are included in the value-based or bundled payment codes. Not knowing which services constitute respite care or the appropriate reimbursement for those services, the awardee cannot easily gather best practices or build on existing MCO agreement successes. To address these challenges, the awardee is working with sites to standardize respite care services as much as possible and to build a value proposition for MCOs to reimburse clinical providers for respite care services. National Health Care for the Homeless recently obtained Medicaid data from one state Medicaid agency, which will facilitate return-on-investment analyses and can be used by sites in negotiations with payers.

At one site, a stand-alone EMR allows staff to easily add new payers, such as MCOs, and handle a greater volume of patients and claims for reimbursement. Each time a new payer signs a contract, this site has developed a process for explaining the documents and rules that govern that payment model to the practice management vendor. The vendor is then responsible for loading any special rules from the payer to help the site automate the process. The site's internal EMR communicates with the practice management suite, which handles coding, formatting, and billing for the payer. The site has designed its EMR to communicate seamlessly with its practice management suite so that billing is applied automatically.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our summary of the baseline characteristics of the treatment group, which we measured during the 12 months before each beneficiary's enrollment date and the initiation of respite care services. The treatment group being assessed for this evaluation consists of Medicaid and Medicare fee-for-service (FFS) beneficiaries who are enrolled in the program. The majority of participants are enrolled in Medicaid; we are awaiting state Medicaid data from the awardee for the treatment group.

A. Baseline characteristics of the treatment group

National Health Care for the Homeless began to enroll participants in the five respite care program locations as follows: Phoenix, Arizona, and New Haven, Connecticut, starting on March 2, 2015; Portland, Oregon, starting on June 8, 2015; Seattle, Washington, starting on August 17, 2015; and Minneapolis, Minnesota, starting on September 21, 2015. As of May 2016, the awardee had enrolled 748 participants in the program, including 603 participants with Medicaid only. The remaining participants had Medicare, were dual eligibles, or were uninsured.

In presenting the baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to be enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each enrollee and therefore varies by enrollee. After we excluded beneficiaries who did not meet the above criteria, a total of 61 participants (8.2 percent) were included in the analysis of baseline characteristics for this report.

The Medicare FFS beneficiaries participating in respite care are characterized by a high level of disability and medical comorbidity (Table 2). The majority of participants in the treatment group are younger than 65 (77 percent), male (90 percent), and white (75 percent). The original reason for Medicare eligibility was primarily disability (79 percent), compared with 24 percent of Medicare beneficiaries nationwide. Only 16 percent of participants were originally eligible for Medicare because of age or survivor's insurance, while 5 percent of participants were eligible because of end-stage renal disease (ESRD). Seventy-nine percent of participants are dually eligible for Medicare and Medicaid, although in some cases Medicaid benefits may be restricted to the payment of co-insurance and deductibles. The average hierarchical condition categories (HCC) risk score of participants is 2.7, which means that patients recruited for the respite care programs are predicted to be 170 percent more costly than the general Medicare FFS population in the first year of the program.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 61)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	47	77
65 to 74	14	23
75 to 84	0	0
85 and older	0	0
Gender		
Female	6	10
Male	55	90
Race		
White	46	75
Black	11	18
American Indian, Alaska Native, Asian/Pacific Island American, or other	2	3
Hispanic	1	2
Original reason for Medicare eligibility		
Old age and survivor's insurance	10	16
Disability insurance benefits	48	79
ESRD[a]	3	5
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	48	79
HCC score[c]		Statistic
Mean		2.7
25th percentile		1.48
Median		2.33
75th percentile		3.07

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the awardee indicated the beneficiary was enrolled in the respite care program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition categories

In Table 3, we report baseline utilization and expenditure data for the treatment group on a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation. The awardee aims to lower the total cost of care by reducing emergency department (ED) visits, hospital readmissions, and hospital length of stay. We examined baseline cost of care by calculating average per beneficiary per month (PBPM)[5] Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $4,357 compared to the national average Medicare spending of $864 PBPM.[6] The quarterly PBPM payments ranged from $2,840 to $7,969. The average PBPM Medicare payment for inpatient services ($2,516) was the largest driver of the total cost of care and was comparable to or less than inpatient costs observed in studies of other urban homeless populations, such as in Harris County, Texas ($4,023 PBPM)[7] and Chicago, Illinois ($2,085 PBPM).[8] Quarterly expenditures for inpatient services in the final baseline quarter were two to four times those of previous quarters, which we would anticipate in an intervention that admits many participants following a hospital discharge.

[5] The months referred to in our calculations are 30-day periods rather than calendar months.

[6] Kaiser Family Foundation, "Medicare Spending Per Enrollee, by State." Available at http://kff.org/medicare/state-indicator/per-enrollee-spending-by-residence/. Accessed October 25, 2016.

[7] Buck, David S., Carlie A. Brown, Karoline Mortensen, John W. Riggs, and Luisa Franzini. "Comparing Homeless and Domiciled Patients' Utilization of the Harris County, Texas Public Hospital System." Journal of Health Care for the Poor and Underserved, vol. 23, no. 4, 2012, pp. 1660–1670. doi:10.1353/hpu.2012.0171.

[8] Basu, Anirban, Romina Kee, David Buchanan, and Laura S. Sadowski. "Comparative Cost Analysis of Housing and Case Management Program for Chronically Ill Homeless Adults Compared to Usual Care." *Health Services Research,* vol. 47, no. 1, pt. 2, February 2012, pp. 523–543. doi:10.1111/j.1475-6773.2011.01350.x.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	61	54	57	60	61
Average Medicare expenditures PBPM[a]					
Total	4,357 (655)	2,887 (782)	2,840 (883)	3,648 (856)	7,696 (850)
Acute inpatient	2,516 (434)	1,423 (454)	1,536 (708)	2,075 (707)	4,783 (617)
Inpatient other[b]	175 (73)	255 (213)	79 (76)	230 (194)	137 (93)
Outpatient[c]	644 (124)	491 (115)	515 (121)	533 (129)	1,001 (205)
Physician services	630 (100)	412 (89)	384 (93)	553 (119)	1,115 (195)
Home health	48 (15)	11 (11)	25 (17)	47 (24)	104 (40)
Skilled nursing facility	318 (104)	272 (160)	285 (181)	192 (114)	508 (182)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	27 (8)	23 (9)	18 (8)	18 (11)	47 (26)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	2,296 (386)	1,502 (534)	1,172 (390)	1,997 (612)	4,292 (478)
Outpatient ED visits	7,117 (1,496)	4,430 (1,053)	4,248 (815)	5,923 (1,579)	13,208 (3,638)
Observation stays	795 (320)	225 (126)	732 (289)	895 (395)	1,255 (692)
Primary care visits in any setting	20,539 (3,102)	16,294 (3,882)	15,161 (3,413)	17,770 (3,765)	31,764 (4,362)
Primary care visits in ambulatory settings	8,283 (1,311)	6,683 (1,198)	8,130 (2,101)	6,543 (1,332)	11,491 (1,766)
Specialist visits in any setting	25,660 (3,763)	15,693 (3,301)	15,234 (3,671)	26,585 (5,804)	42,925 (6,941)
Specialist visits in ambulatory settings	7,576 (1,151)	6,758 (1,565)	4,101 (873)	6,887 (1,600)	12,085 (2,008)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	82 (5)	19 (5)	16 (5)	26 (6)	72 (6)
Percentage with an outpatient ED visit[e]	87 (4)	45 (7)	52 (7)	52 (7)	73 (6)
Percentage with an observation stay[f]	34 (6)	6 (3)	13 (4)	14 (4)	13 (4)
Percentage with a 30-day readmission among all discharges	38 (5)	48 (10)	22 (10)	37 (13)	37 (7)
Percentage of participants with a readmission among all participants	24 (6)	11 (4)	7 (3)	5 (3)	17 (5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

The Medicare FFS beneficiaries enrolled in respite care are high utilizers of acute care services. The rate of acute care hospitalizations was 2,296 per 1,000 Medicare FFS participants per year during the baseline year, compared with the national rate of 274 acute care hospitalizations per 1,000 Medicare FFS beneficiaries.[2] Other studies have reported similar rates of hospitalization in homeless populations (3,000 to 3,600 hospitalizations per 1,000 beneficiaries).[9,10] Eighty-two percent of participants had at least one hospitalization during the 365 days before enrollment. The rate of ED visits was 7,117 per 1,000 participants per year in the baseline year, compared with a national rate of 652 per 1,000 Medicare beneficiaries annually.[11] The rate of ambulatory observation stays was 795 per 1,000 beneficiaries per year in the baseline year. Overall, observation stays at baseline far exceeded the national average of 58 per 1,000 beneficiaries in 2014.[12] For all acute care services, fourth quarter utilization rates were nearly double those of previous quarters, which may represent the transfer of patients from an ED or hospital observation unit to respite care rather than inpatient admission.

In the baseline year, the rate of primary care visits (8,283 per 1,000 Medicare FFS participants per year) was similar to the rate of specialty services in ambulatory settings (7,576 per 1,000 Medicare FFS participants per year). Primary care and specialist visits in ambulatory settings were strikingly high in the fourth quarter. This may be a result of some participants being referred to respite care from clinical outpatient sites, given that approximately 40 percent of all participants (not just Medicare FFS beneficiaries) were recruited from non-acute care settings. However, we may be observing a selection bias of high utilizers in an insured homeless sample. The odds of an insured homeless patient using ambulatory care services are 2.5 times higher than those of a homeless patient who lacks insurance.[13] In addition, a Canadian study suggested that health care utilization outliers were more prevalent among homeless patients compared with controls who were not homeless.[14]

Thirty-eight percent of all hospital discharges were followed by a readmission in the 30-day post-discharge window in the baseline year. However, we could be observing an artificially low readmission rate in the fourth quarter if patients who enrolled after an admission at the end of the baseline period were potentially protected from readmission by the respite care intervention. The

[9] See Buck et al. (2012).

[10] Sadowski, Laura S., Romina A. Kee, Tyler J. VanderWeele, and David Buchanan. "Effect of a Housing and Case Management Program on Emergency Department Visits and Hospitalizations Among Chronically Ill Homeless Adults: A Randomized Trial." *JAMA,* vol. 301, no. 17, 2009, pp. 1771–1778.

[11] See the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed October 2016.

[12] See the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://medpac.gov/-documents-/data-book. Accessed October 2016.

[13] Kushel, M. B., E. Vittinghoff, and J. S. Haas. "Factors Associated with the Health Care Utilization of Homeless Persons." *JAMA,* vol. 285, no. 2, January 10, 2001, pp. 200–206.

[14] Hwang, S. W., and M. J. Henderson. "Health Care Utilization in Homeless People: Translating Research into Policy and Practice." Rockville, MD: Agency for Healthcare Research and Quality, October 2010. Available at http://gold.ahrq.gov.

percentage of hospital discharges with a 30-day readmission (38 percent) was approximately twice the national average for Medicare beneficiaries (18 percent).

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on the three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: National Health Care for the Homeless Council

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	98
Projected Medicaid population with 6 months of program exposure	518
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,003
Likelihood of all-cause hospitalizations	161
MDE sample size requirement to detect 20% effect	
Total expenditures	251
Likelihood of all-cause hospitalizations	40
Participation/Selection bias of concern	Yes, patient self-selection high/high refusal rate
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA-R2 award
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Serious concern. We may be not able to identify a strong comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Lack of strong comparison group
Survey data for treatment group that will be analyzed	Staff survey
Implementation data that will be analyzed	Implementation data provided by awardee for treatment group that will allow us to examine implementation of the core elements of respite care—that is, care management, patient engagement, and transitional care

At this point, we do not expect to conduct a rigorous impact evaluation for the awardee. We are primarily concerned with identifying a solid comparison group comprised of homeless individuals with Medicare or Medicaid insurance by using ICD supplemental diagnosis codes reflecting homelessness.[15] Using 2014 Medicare claims data, we did identify a total of 7,869 Medicare FFS beneficiaries with a homeless diagnosis code in the five study states. We will evaluate the rate of homelessness reporting on Medicare and Medicaid claims for the treatment group. We will revisit this assessment of evaluability should there be a moderate to high rate of claims-based identification of the treatment group as homeless. We will continue to report on the awardee's self-monitoring measures to examine implementation of the core elements of respite care—that is, care management, patient engagement, and transitional care. We will also report on the experiences of staff, based on our survey.

[15] We will attempt to identify beneficiaries with a diagnosis of homelessness: lack of housing (V60.0), inadequate housing (V60.1), economic problems (V60.2), other housing or economic circumstances (V60.89), or unspecified housing or economic circumstances (V60.9). V codes are used to describe beneficiaries' encounters with circumstances other than disease or injury, including circumstances that can influence a person's health status, such as disease exposures or, in our case, homelessness.

V. NEXT STEPS

A. Implementation evaluation

As National Health Care for the Homeless enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

For upcoming reports, we will continue to report baseline characteristics for the Medicare FFS population. We will report on Medicaid beneficiaries as data become available from the awardee. In addition, we will explore the feasibility of identifying a strong comparison group of Medicare and Medicaid beneficiaries. However, we have serious concerns about our ability to identify a comparison group of similar homeless individuals by using claims data. The small number of treatment beneficiaries across the five program sites is also concerning.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we administered a survey of non-clinician staff affiliated with the program. The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, data managers, social workers, pharmacists, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

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APPENDIX B.23.

NEBRASKA MEDICINE

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MATHEMATICA Policy Research

REPORT

APPENDIX B.23

HCIA Round Two Evaluation: Nebraska Medicine

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Remote Interventions Improving Specialty Complex Care (RIISCC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Nebraska Medicine's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Nebraska Medicine made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Nebraska Medicine addressed the issues identified during the first program year? What factors have influenced the ability of Nebraska Medicine and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Nebraska Medicine's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the RIISCC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to, and any findings from, our analysis of Medicare claims (Section IV)
- Next steps in our implementation and impact evaluations, including the participant survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Nebraska Medicine has used funding from HCIA R2 to create and implement the RIISCC program (key program characteristics are noted in Table 1). The RIISCC program provides remote patient monitoring (RPM) for participants with diabetes for 90 days after they are discharged from the hospital as well as an additional nine months of health coaching. The program was launched on December 22, 2014. Nebraska Medicine's goal is to enroll 3,300 participants during the three-year cooperative agreement.

Other partners in the RIISCC program include a community hospital that is part of Nebraska Medicine and three primary care clinics. The RIISCC program starts with the identification and recruitment of hospitalized patients diagnosed with type 2 diabetes who are age 19 or older, not pregnant, and residing in the targeted zip codes. Patients may have been admitted for any reason, not necessarily for a condition related to their diabetes—for example, a same-day procedure such as a colonoscopy. Registered nurses (RNs), who act as health coaches, recruit eligible participants while they are still inpatients or by telephone if they have been discharged. A lead nurse visits eligible hospitalized patients to describe the program's features, benefits, and enrollment process. Eligible patients who have been discharged before one of the nurses could approach them in the hospital receive a phone call within four weeks of the discharge to discuss the program. If the patient agrees to participate, the nurse schedules a time for a medical assistant (MA) to go to the patient's home to deliver, install, and demonstrate how to use the RPM equipment.

RPM equipment installed in the participant's home is used to transmit information about the participant's weight, body mass index, blood pressure, and blood glucose values to the health coach and providers. Participants receive weekly calls from their health coach to discuss critical values and to arrange for tests or consultations as needed. After 90 days of RPM, participants visit one of the primary care clinics to return their RPM equipment, check their hemoglobin A1c level, receive a foot and eye exam, and receive nutritional counseling. After the 90 days, participants receive nine months of monthly coaching calls. A $10 gift card is given to participants as an incentive at each stage of the program. An additional $10 gift card is given for returning the RPM equipment, for $50 total in gift card incentives.

The specific program goals are to (1) improve diabetes-related care following hospital discharge, (2) reduce all-cause admissions and emergency department visits within 90 days of discharge, (3) reduce hospitalizations for uncontrolled diabetes, and (4) reduce the total costs of care for participants.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Nebraska Medicine during the first year of its cooperative agreement.

- The awardee enrolled over 400 patients in the first year, after a slow start to the program.
- The awardee achieved significant early improvements in the hemoglobin A1c values of participants. According to the awardee, of the participants who completed the 90-day phase of the program, only 13.2 percent had a hemoglobin A1c value greater than 9, compared

with 44.6 percent at baseline. This represented a 71 percent drop in patients with hemoglobin A1c levels over 9.[2]

- The awardee developed a data management plan to monitor program participation and intermediate outcomes, and created tools to integrate disparate information from different sources.
- An interface for the RPM software and Nebraska Medicine's electronic medical record (EMR) system was developed to give clinicians easy access to patients' RPM information, such as blood glucose levels, blood pressure, weight, and vital signs.

We also identified several initial challenges in implementing the program and Nebraska Medicine's strategies for addressing them.

- **Staffing.** The original project director resigned in June 2015 with short notice; three more staff members (a lead nurse and two MAs) also resigned that summer. Nebraska Medicine appointed a new project director/principal investigator and a co-principal investigator in summer 2015. A new director started in early 2016. Program staff worked with Nebraska Medicine's Human Resources Department to identify ways to improve the recruitment and hiring process, and they were able to fill several positions.
- **Recruitment and enrollment.** The number of patients identified as eligible for the program was lower than projected. The acceptance rate of patients who were approached to enroll (approximately 50 percent) also was lower than anticipated. A number of programmatic changes increased enrollment, including adding Bellevue Hospital and Clinic to the program. A clinician with extensive EMR expertise helped the team refine the criteria for identifying patients in the EMR system, which doubled the number of eligible patients. Experts in recruitment and enrollment for research studies at the University of Nebraska Medical Center advised the team on how to improve the protocols and scripting to increase the program acceptance rate.

Finally, we identified several early lessons learned by Nebraska Medicine in implementing its program.

- Intensive RPM enhanced participants' accountability for their health and appeared to show great promise in driving improvements in clinical outcomes such as blood glucose control for people with diabetes.
- Collaboration, communication, and coordination among Nebraska Medicine clinical staff who treated the same patients created a seamless experience for participants and prevented the duplication of clinical efforts.

[2] Hemoglobin A1c, measured through a simple blood test, is a key metric for diabetic patients to monitor their blood glucose control. People without diabetes have values between 4 and 5.6; levels of 6.5 or above indicate diabetes. The closer the hemoglobin A1c level is to normal, the better—typically, 7.0 or less. However, the individual target for a person may depend upon his or her age or the presence of other illnesses, such as heart disease.

- A strong communication plan should be in place early in a chronic disease management program such as this one. The plan should include primary care physicians (PCPs) so that they understand the program and can help achieve its goals.
- Careful planning is needed to achieve appropriate program sequencing, especially with respect to the time needed to acquire equipment for remote retinal eye exams, to establish the interface for the RPM equipment and the EMR system, and to train and certify the staff to give the eye exams.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Nebraska Medicine made progress in the following areas:

- The RIISCC program reached 39 percent of its three-year projected enrollment target.
- The RIISCC program hired and retained 20 staff, including a clinic manager, lead RNs, RN health coaches, and certified diabetes educators. The new clinic manager focuses on clinical services and processes, staff productivity and satisfaction, and data tracking.
- The RIISCC program secured rooms in all three participating clinics for the 90-day patient visits.
- The RIISCC program continued to address enrollment and disenrollment challenges—efforts that resulted in both increased enrollment and decreased disenrollment. For example, the algorithm for identifying eligible participants in the EMR system was further improved and participants were given a longer time period (four weeks instead of two weeks) to decide if they wanted to participate.
- Nebraska Medicine is in the early stage of its payment model development. The awardee obtained internal treatment cost data for program participants as well as for those who were eligible but declined to participate. The latter group serves as a comparison group to help determine the cost savings of the program.
- As part of its marketing plan to enhance awareness among Nebraska Medicine clinicians, RIISCC staff created a brochure and a short video featuring a patient and two of the program's best nurses. The video will be posted on Nebraska Medicine's intranet to enhance awareness of the program to internal medicine and family medicine clinics.

Over the past year, Nebraska Medicine also made several changes to its program:

- The team was originally conducting dilated eye examinations, which required medications that posed risks for adverse reactions. After internal review, the program now only performs nondilated examinations.

Below we note the key challenges that Nebraska Medicine has worked to address in the second year of its cooperative agreement.

- The equipment used to perform the eye exams has been unreliable and has needed frequent repairs. Program leaders are looking into replacing the equipment with new units or a different model of camera entirely.
- Nebraska Medicine continued to have difficulty with obtaining Medicaid and other claims data that are needed to develop the payment model. The awardee is working with the Payer Relations Department at Nebraska Medicine to improve communication with payers in order to obtain claims data.
- MA turnover has also been an issue. Being down one or two MAs has made it difficult to schedule home equipment setup and to process RPM equipment for delivery or return, which has reduced program efficiency.

As Nebraska Medicine enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Engaging payers has been difficult, which has delayed the development of a payment model. Nebraska Medicine been trying for over a year and a half to engage other payers besides Blue Cross Blue Shield of Nebraska.
- Nebraska Medicine will continue to leverage internal data that allows a comparison of costs and utilization for patients who participate in the RIISCC program with a matched comparison group of patients who declined participation. Although the data and methods are not as robust as having claims data from multiple payers, the RIISCC program's preliminary findings suggest favorable effects on cost and utilization.

  The awardee is developing a proposal for CMS approval to have a pilot clinic operate alongside the RIISCC program, starting in Year 3. If approved by CMS, the program will focus on monitoring participants' blood glucose levels but will not include the 90-day follow-up visits or monthly coaching calls. Pilot patients will be referred by their ambulatory care providers, with pre-post hemoglobin A1c levels taken at their PCP's office. Nebraska Medicine considers this to be a major step toward sustainability because with more participants there will be greater economies of scale and the program will be able to demonstrate if it is effective in decreasing blood glucose levels and improving patients' outcomes.

Table 1. Nebraska Medicine: RIISCC characteristics at a glance

Program characteristic	Description
Purpose	To provide RPM and health coaching to individuals with type 2 diabetes who live within 30 miles of Nebraska Medicine's main campus
Components	• Care management • Telemedicine • Patient and family engagement • Home care
Target population	Residents of Douglas, Sarpy, and Cass counties (in the greater Omaha metropolitan area) who live in medically underserved areas, are age 19 or older, have a diagnosis of type 2 diabetes, have been recently discharged from the hospital, and are at high risk for readmission
Theory of change/theory of action	Nebraska Medicine (NM) hypothesizes that by providing early and timely post-discharge services (including home telehealth equipment and telephone coaching) and incentives to promote self-management, the RIISCC program will do the following: • Improve care at transitions • Improve key diabetes metrics (blood glucose levels, blood pressure, hemoglobin A1c, body mass index) • Reduce admissions for uncontrolled diabetes • Reduce total costs of care for the participating target population
Payment model	New fee-for-service (FFS) payment with shared savings and bundled per episode payment
Award amount	$9,993,626
Launch date[a]	December 22, 2014
Setting	• Academic medical center • Community health care clinics • Participants' homes
Market area	Urban
Market location	Douglas County, NE, where the city of Omaha is located, and Sarpy and Cass cCounties, both of which are south of Douglas County,
Outcomes	• Improved blood pressure and hemoglobin A1c • Fewer all-cause unplanned readmissions hospital-wide • Fewer emergency department visits • A reduction in body mass index • A reduction in morbidity and mortality due to diabetes and obesity • An increase in the percentage of participants receiving diabetes eye and foot exams

[a]After the initial planning period, the awardee's program began to operate as of this date.

MA = medical assistant; PCP = primary care physician; RPM = remote patient monitoring

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Nebraska Medicine in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 18 through July 21, 2016. For the analyses of Nebraska Medicine's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Principal investigator
- Grant (cooperative award) manager
- Telehealth clinic manager
- RN health coach
- Diabetes educator
- Clinical director of the Nebraska Medicine Diabetes Center
- RIISCC program medical director, who is also a physician champion at one of the three participating outpatient clinics (also referral source)
- Payment model specialist

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment or payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area

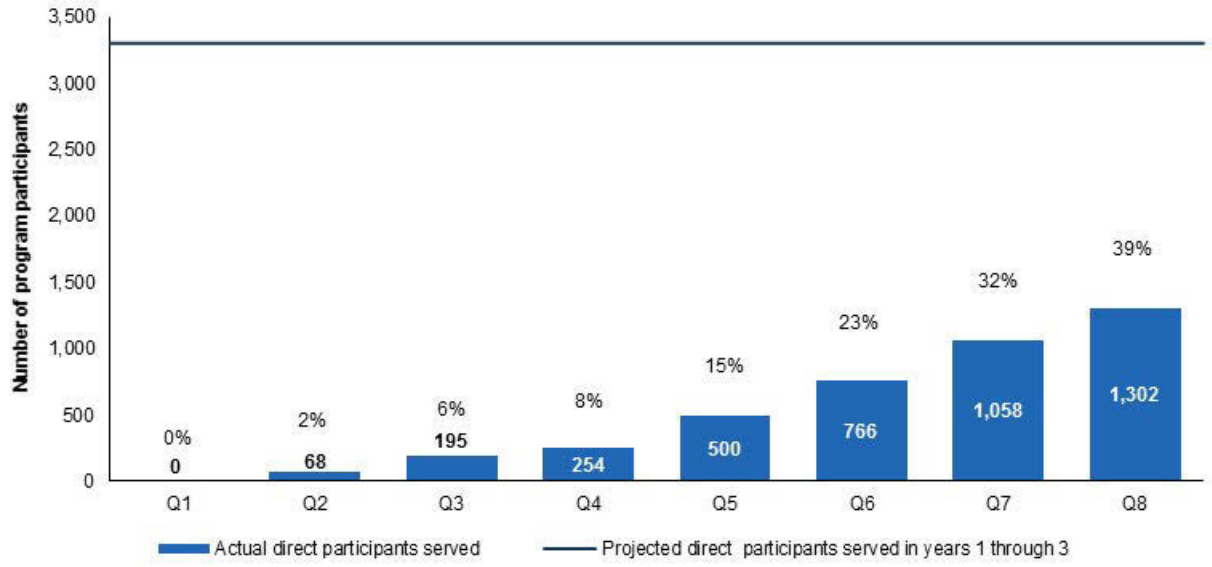
[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

includes an update on Nebraska Medicine's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Overall, Nebraska Medicine reported to the implementation and monitoring contractor that it directly served 1302 participants from December 2015 (the launch of its program) through August 2016, which represents about 39 percent of its 3300 projected direct participants (Figure 1). Nebraska Medicine has been consistently enrolling a similar number of patients per quarter over the last year. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. NM does not have indirect participants.

Nebraska Medicine's progress in meeting its three-year enrollment goal was influenced by several factors. They acknowledge that the number of patients discharged from the two referral hospitals with diabetes and eligible for RIISC is lower than originally projected. However, Nebraska Medicine has been steadily improving its recruitment and enrollment, while reducing disenrollment rates. The criteria for identifying eligible patients have been improved several times since the program began. The eligibility criteria were modified so that patients who had previously declined participation are now eligible for the program if they are hospitalized again. This change has resulted in many more eligible patients. In addition, patients are now given up to four weeks (instead of two weeks), with weekly follow-up calls from the lead nurse, to decide

whether to participate. The disenrollment policy also has been liberalized so that patients who do not upload data for as long as two weeks are no longer disenrolled; rather, coaches continue to work with them and encourage them to upload their data. The disenrollment rate was 24 percent of patients at the end of Year 2, which the awardee considers to be low for this type of program and population. Most disenrollment now occurs due to factors that are beyond the program's control, such as death of the participant or a close family member or participant illness or hospital readmission.

Nebraska Medicine has strived to increase enrollment in many ways. The program is now briefly introduced to patients in the hospital, and they are given information to take home. After discharge, the same information is again sent to the home, and a nurse health coach calls the patients to recruit them. Primary care medical teams and diabetes educators in both the inpatient and outpatient areas are sources of referrals during hospitalizations and at the first post-hospital follow-up visit. Patients are also invited to participate via messages delivered electronically through One Chart's patient portal.[4] The delivery of the RPM equipment is directed by the patients, and it can be sent to their home or to their place of business, or given to them during a visit to Nebraska Medicine. Getting buy-in from patients' PCPs and staff on the inpatient unit has helped enrollment at the hospital. The goal is to get the RIISCC program nurses on the floor to recruit patients and educate the hospitalist team caring for the patients. The hospitalists do not have the established relationships that primary care and other physicians have with eligible potential participants, so program staff are educating these physicians to encourage their patients who have been hospitalized to participate (including through the internal marketing and educational video mentioned earlier).

RIISCC staff have implemented some of the strategies recommended through technical assistance from the implementation and monitoring contractor. For example, the program packets that participants receive now include photos of the nurse coaches and MAs so that participants know who they will be working with. RIISCC staff are also working to "enhance intentionality" with patients by asking them to think about things such as where they will put the RPM equipment and who they would contact if they needed help with the equipment.

An ongoing enrollment barrier has been recruiting and turnover of the MAs, who deliver and set up the RPM equipment at patients' homes. At times, not having enough MAs has put the program behind in getting patients enrolled and started with services.

Nebraska Medicine is unlikely to achieve its targeted enrollment goal. They are approaching the limit in the number of potential participants that are determined to be eligible, agree to participate, and stay in the program. At the same time, maintaining the number of staff who can deliver, install, and support the remote monitoring equipment has been challenging.

[4]One Chart Patient is Nebraska Medicine's program for extending its EMR, EPIC Care, to patients. The software includes applications for scheduling, registration, billing, and an online portal.

B. Implementation of the service delivery model

In the second year of the cooperative agreement, Nebraska Medicine has made substantial progress in implementing the RIISCC program. Program leaders note that they are constantly making improvements to the program's implementation.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The intervention has been facilitated by a consistent design that has undergone little change since program inception. The program has been well-received by patients and the awardee's self-monitoring data have shown early and consistent favorable outcomes.

Nebraska Medicine has implemented IT solutions that support the flow of information from the program to patients' PCPs. They developed an interface that allows patient data from the RPM system to be transferred into the EMR system at Nebraska Medicine and at Bellevue Hospital, which facilitates communication and collaboration between the health coaches and participants' PCPs. A new section of the EMR system has been set aside for telemedicine encounters; it displays the RPM data along with the coaching notes. Clinicians involved in the program are highly satisfied with the interface, which supports their clinical workflows and thus the sustainability of the program.

The awardee also established a mechanism to compile and electronically link not only the data that are available from the EMR and RPM systems but also the various types of program data that staff collect. For example, during enrollment staff collect and record data on demographics including contact information. Information may be gathered on the home environment by the MAs while setting up equipment at a patient's home, as well as the data for the baseline Patient Activation Measure survey. The first patient uploads of RPM data—baseline weight, blood pressure, and hemoglobin A1c levels—are also collected during the home visit. Health care utilization data may be collected during calls with the patients. Foot exam and hemoglobin A1c test results, the follow-up Patient Activation Measure data, and participant satisfaction data are collected at the 90-day visits. Some data may also be collected post-intervention during the follow-up calls such as hospital admissions or emergency room visits. RIISCC program staff are using iPads and REDCap (Research Electronic Data Capture, a web-

based software tool) to capture and upload data from the patients and to help manage the program database. The streamlined process and the new unified database helps the awardee to evaluate health outcomes and conduct the economic analyses necessary for developing a payment model.

One of the major barriers to the intervention model, particularly in Year 1, was maintaining enough MAs and nurses, who are critical to providing program services. Nebraska Medicine now keeps a running job advertisement for nurses and MAs.

Nebraska Medicine was successful in conducting 90-day visits at three remote clinics, but encountered challenges with some of the equipment used during these visits. The cameras used to perform eye exams were unreliable and needed frequent repairs. Program managers are looking into replacing the equipment with new units or a different model of camera. The awardee is also exploring outsourcing to a vendor that owns and leases the RPM equipment. The vendor would maintain, ship, and support the equipment, rather than Nebraska Medicine owning and being responsible for the equipment.

2. Implementation processes

The implementation process has continuously improved after some important course corrections were made in Year 1. Overall implementation has gone largely as planned. Year 2 enrollment goals were met and, for the first time, a monthly enrollment goal was exceeded. Nebraska Medicine has improved enrollment and reduced disenrollment and has streamlined its internal processes to make the overall program implementation more efficient.

Nebraska Medicine has new positions for a telehealth director and a RIISCC telehealth clinic manager. The latter position has been filled with an RN who works under the new telehealth director. Both are improving and advancing Nebraska Medicine's telehealth program as well as the RIISCC program. The telehealth clinic manager focuses on the integration of telehealth into the existing clinical workflow, which had been lacking. She has knowledge of clinical personnel, equipment managing and processing, policies and procedures, and the other day-to-day concerns of the clinical staff. The clinic manager has helped to meet staffing needs by working through the Nebraska Medicine hiring bureaucracy. She is also building relationships across Nebraska Medicine and increasing awareness among Nebraska Medicine physicians.

3. Organizational and external context

Nebraska Medicine program leaders attribute much of the program's apparent success to the staff's commitment to the program, their clinical skills, and their strong rapport with their patients. Seeing improvements in patients' blood glucose control and high patient satisfaction further enhances staff commitment to the program.

The interdisciplinary RIISCC team meets regularly to monitor and improve the program. Since Year 1, program staff have held weekly leadership meetings that include the program's principal investigator and lead nurses; the grant manager for the HCIA R2 cooperative

> "One of the best things they have established is the education of the RN staff with the diabetes center clinical director. Twice a month we meet with staff and talk about how they handle their patients. And all of them learn from this. They work through real examples."
>
> *— RIISCC program medical director and physician champion*

award; the RIISCC program medical director; the clinical director of Nebraska Medicine's diabetes center; and, more recently, the telehealth clinic manager. There are also biweekly meetings that the lead nurses, health coaches, MAs, and telehealth manager attend.

Bimonthly classes are held for lead nurses and health coaches during which each brings a case and they review them together with the RIISCC program medical director and the diabetes center's clinical director. These case review meetings provide an opportunity for staff to learn from each other and also to receive guidance and feedback from the physicians. The health coaches and physicians are able to work together in a complementary fashion: the majority of the coaches' work is providing education about lifestyle and adherence to medications, while the diabetes center's director helps with any medication changes.

Another facilitator is that RPM is an important component of the larger Nebraska Medicine organization's patient-centered medical home initiatives in ambulatory care. In Nebraska Medicine's community health needs assessment, access to care and diabetes emerged as the top two issues. RPM has been identified as having great promise for meeting both of these needs, so organizational recognition of the importance of the RIISCC program is growing.

Organizational support for the program is increasing as more physicians see the benefits of RPM—while the health coaches ensure appropriate care and delivery of early intervention, the physicians can focus on direct patient care. For example, if a patient has elevated blood sugars or other poor clinical indicators, a physician will typically schedule a three-month follow-up appointment, with a one-month check-in appointment to make sure the patient is on the right track. However, this schedule makes it difficult for physicians to closely monitor their patients, as patients are "on their own" and not monitored in between appointments. As the medical director noted, there is a "big need" for ambulatory telehealth to monitor patients and "keep them out of the hospital in the first place." In addition to freeing up physician time, the program helps to ensure that hospitalized patients with diabetes who do not have a PCP are referred to one.

> "A patient did not have a primary care physician and was hospitalized for orthopedic surgery. His orthopedist didn't feel comfortable changing the patient's diabetes medications, so the patient continued on the same regimen. As a result of the RPM program, the patient was referred to a PCP and a cardiologist. They helped the patient rebalance his medications and dosages and significantly improve his edema."
>
> *— RN health coach*

C. Development of the payment model

Nebraska Medicine has made some progress in developing a bundled, fee-for-service payment model with shared savings. In this model, the payer reimburses the hospital a set amount per patient for one episode of services provided by the whole RPM team—including, PCPs, nurses, MAs, dietitians, ophthalmologists, and other staff—rather than paying for each individual service. There would be savings if the telemedicine program improves patients' clinical outcomes and reduces their use of inpatient and emergency department care.

In order to determine a reasonable charge rate for telemedicine services provided to diabetic patients, the awardee estimated the cost of providing the telemedicine services to a patient during the 90-day RIISCC intervention and subsequent follow-up during the next nine months. Program staff conducted a review of telemedicine program costs nationally to better understand the cost

breakdowns of telemedicine programs. The awardee estimated its direct and overhead costs and related these costs to the total number of patients served by the program. Preliminary estimates suggested that the average cost for serving a diabetic patient in the 90-day program would be about $1,800. However, the cost may be reduced with increased patient enrollment and greater economies of scale.

Nebraska Medicine also identified a comparison sample of patients to assess the effectiveness of the program in reducing health care utilization and costs relative to similar patients who receive conventional care. This information is important for engaging and motivating payers to participate in the new payment model. Nebraska Medicine was able to compile de-identified claims data for diabetic patients who met the program's enrollment criteria but declined participation. Their initial comparison of costs indicated that when compared to the comparison group, program participants had substantially lower rates of ED use, readmissions, and related costs—although, some of the differences were not statistically significant due to the modest sample size. The analysis also could not be broken down by payer due to sample size. The analyses are being repeated as more data become available. However, the awardee has concerns about making enough progress on the payment model and toward sustainability before the cooperative agreement ends.

The awardee's payment model is hindered by the lack of claims data from payers other than Blue Cross Blue Shield. The awardee submitted data use agreement forms to CMS and supporting documents to get access to Medicare data. A year later, the awardee had not yet received the data. The Nebraska Medicaid office was also working on providing the awardee with claims data. However, the state system is antiquated and after several months the Medicaid office still was unable to provide the data. The awardee was also working with the Payer Relations Department at Nebraska Medicine in the hopes that it would be more successful in starting a dialogue with Medicaid and other payers.

The awardee received feedback on its payment model from the implementation and monitoring contractor. The contractor provided positive feedback on the program and the preliminary findings on patient clinical outcomes based on Nebraska Medicine's internal data. The contractor encouraged Nebraska Medicine to leverage this feedback for payer engagement and payment model development.

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IV. FINDINGS FROM ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section summarizes baseline characteristics of the treatment group, which were measured during the 12 months before each beneficiary's enrollment date in the RIISC program. The treatment group consists of beneficiaries admitted to an inpatient or outpatient stay at Nebraska Medical Center with a primary or secondary diagnosis of Type 2 diabetes and who accepted the invitation to participate in the program.

A. Baseline characteristics of treatment group

Nebraska Medicine began to enroll Medicare beneficiaries in the RIISC program in January 2015. As of the end of May 2016, the awardee had enrolled 329 beneficiaries.

In presenting baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when they became eligible for awardee-provided services (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before enrollment). In addition, they must have been enrolled in the program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, 299 participants were included in the analysis of baseline characteristics for this report.

Participants were more likely than the Medicare population as a whole to be nonwhite, originally entitled to Medicare because of a disability, and enrolled in both Medicare and Medicaid (Table 2). The differences in the populations for the latter two categories were marked. A Mathematica analysis of a random 5 percent sample of Medicare beneficiaries found that 24 percent of beneficiaries nationally were originally entitled to Medicare because of a disability. Among Nebraska Medicine's program enrollees, the figure was 51 percent. Furthermore, among program enrollees, 34 percent of Medicare beneficiaries were also enrolled in Medicaid, compared to 14 percent nationally.[5]

[5] See the report on Medicaid enrollment from the Medicare Payment Advisory Commission and the Medicaid and CHIP Payment and Access Commission at http://www.medpac.gov/docs/default-source/data-book/january-2015-medpac-and-macpac-data-book-beneficiaries-dually-eligible-for-medicare-and-medicaid.pdf.

Program participants by definition have a least one chronic medical condition—that is, diabetes. Moreover, all participants, again by definition, were discharged at least once for inpatient or outpatient care in the baseline year. It is therefore not surprising that their Medicare utilization and expenditures are well above average. As Table 3 shows, the mean expenditure per beneficiary per month (PBPM) in the baseline year was $1,897—more than double the national average of $792. Acute hospital admissions, at 1,059 per 1,000 beneficiaries per year, were far greater than the national average of 274 per 1,000 beneficiaries in 2014. Emergency department (ED) visits and observation stays for the treatment group were also well above national averages.[6]

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 299)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	104	35
65 to 74	139	46
75 to 84	45	15
85 and older	11	4
Gender		
Female	174	58
Male	125	42
Race		
White	215	72
Black	75	25
American Indian, Alaska Native, Asian/Pacific Island American, or other	5	2
Hispanic	2	0.67
Original reason for Medicare eligibility		
Old age and survivor's insurance	141	47
Disability insurance benefits	152	51
End-stage renal disease (ESRD)[a]	6	2
Hospice[b]	0	0
Medicare/Medicaid dual status, percent dual[b]	103	34

[6] For national average rates, see the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html.

Table 2 *(continued)*

Characteristics	All participants (N = 299)	
	Number	Percentage
Hierarchical condition categories (HCC) score[c]		Statistic
Mean		2.1
25th percentile		1.12
Median		1.73
75th percentile		2.72

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary agreed to participate in the program and to have monitoring equipment installed at home. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the algorithm for new enrollees. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	299	273	284	219	299
Average Medicare expenditures PBPM[a]					
Total	1,897 (164)	1,478 (329)	1,234 (144)	1,371 (213)	3,396 (298)
Acute inpatient	918 (119)	682 (273)	442 (82)	508 (126)	1,971 (260)
Inpatient other[b]	29 (16)	0 (0)	60 (41)	50 (44)	7 (7)
Outpatient[c]	394 (38)	326 (53)	265 (38)	327 (53)	640 (71)
Physician services	378 (23)	312 (35)	304 (26)	312 (32)	569 (33)
Home health	77 (13)	63 (19)	73 (18)	81 (19)	89 (19)
Skilled nursing facility	61 (20)	67 (34)	54 (32)	49 (26)	74 (35)
Hospice	0 (0)	0 (0)	1 (1)	0 (0)	0 (0)
Durable medical equipment	39 (5)	29 (4)	35 (5)	44 (10)	46 (7)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,059 (94)	721 (191)	633 (107)	538 (109)	2,250 (164)
Outpatient ED visits	1,627 (249)	1,503 (322)	1,136 (217)	1,433 (253)	2,371 (353)
Observation stays	388 (54)	165 (48)	201 (67)	303 (80)	844 (107)
Primary care visits in any setting	10,297 (510)	9,573 (711)	9,028 (679)	8,270 (682)	13,996 (730)
Primary care visits in ambulatory settings	7,445 (337)	7,920 (541)	6,814 (413)	6,133 (421)	8,800 (440)
Specialist visits in any setting	15,822 (1,063)	14,502 (1,669)	14,620 (1,394)	13,576 (1,187)	20,224 (1,175)
Specialist visits in ambulatory settings	10,665 (785)	10,881 (1,051)	10,868 (1,028)	9,951 (847)	10,902 (755)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with hospital admission[d]	57 (3)	13 (2)	13 (2)	10 (2)	46 (3)
Percentage with an outpatient ED visit[e]	53 (3)	19 (2)	15 (2)	19 (2)	33 (3)
Percentage with an observation stay[f]	28 (3)	4 (1)	4 (1)	6 (1)	19 (2)
Percentage with a 30-day readmission among all discharges	20 (3)	16 (6)	33 (7)	14 (5)	12 (5)
Percentage of participants with a readmission among all participants	7 (1)	2 (1)	4 (1)	2 (1)	2 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Nebraska Medical Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	457
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,649
Likelihood of all-cause hospitalizations	553
MDE sample size requirement to detect 20% effect	
Total expenditures	412
Likelihood of all-cause hospitalizations	138
Participation/Selection bias of concern	Yes, patient self-selection high/high refusal rate
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable. Expect to select a comparison group.
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	File identifying treatment refusers

DDB = difference-in-differences Bayesian

We plan to conduct a rigorous evaluation of Nebraska Medicine's RIISC program using a comparison group of Medicare beneficiaries discharged from other hospitals in Omaha and matching on demographic characteristics, prior use, and secondary diagnoses other than diabetes. Because 40 percent or more of those who were offered the program declined to participate, special attention will be required to address possible selection bias.

V. NEXT STEPS

A. Implementation evaluation

As Nebraska Medicine enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We plan to assess program impacts by using a difference-in-differences design that contrasts outcomes for cross-sections of treatment and comparison group members in the pre- and post-intervention periods to estimate the impact of the RIISCC program. Outcomes will be measured for patients discharged from all hospitals in the period from September 2012 to August 2014 (the pre-intervention period) and from September 2014 to August 2017 (the post-intervention period).

The comparison group will be Medicare beneficiaries who reside in Douglas, Sarpy, or Cass counties, Nebraska, who were discharged to home from any of the six general medical-surgical hospitals other than Nebraska Medicine in Omaha (CHI Creighton, CHI Health Immanuel, CHI Bergan Mercy, Methodist Hospital, and Veteran's Affairs Medical Center) with a diagnosis of Type II diabetes or Type II diabetes and a secondary diagnosis of heart failure, hypertension, or acute myocardial infarction between April 2012 and March 2014 (the pre-intervention period) or between April 2014 and March 2017 (the post-intervention period).

We will select the comparison group from the group defined just above by using propensity score matching to select patients who resemble the treatment group in terms of demographic variables and health care utilization and spending in the 24 months before the index hospitalization. After arriving at a candidate comparison group, we will assess whether the distribution of propensity scores is similar for the treatment and comparison groups and whether the means of each covariate used to estimate the scores are similar for the treatment and comparison groups. If the covariates are unbalanced, we will modify the specification of the underlying logistic model, possibly removing variables that appear less important or adding interactions of explanatory variables until a balance is reached. We will report measures of covariate balance in future reports.

We are currently identifying and extracting Medicare FFS claims from the VRDC to identify treatment and comparison groups. Given the relatively small number of Medicaid beneficiaries in the RISC program, we do not plan to seek Medicaid data.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering a survey of participants who received services from the program. The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.24.

NORTHWELL HEALTH

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REPORT

APPENDIX B.24

HCIA Round Two Evaluation: Northwell Health

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Northwell Health's Healthy Transitions in Late Stage Kidney Disease program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Northwell's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Northwell made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Northwell addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Northwell's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Healthy Transitions program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to, and any findings from, our analysis of Medicare claims (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Northwell, formerly North Shore–Long Island Jewish Health System, has used funding from HCIA R2 to create Healthy Transitions, a patient-centered program to integrate and coordinate all aspects of care for participants with advanced chronic kidney disease (CKD). The program, which began in November 2014, focuses on managing issues associated with the disease, such as metabolic complications, comorbidities, the burdens of hospitalization, and preparation for treatment of end-stage renal disease (ESRD). To implement the program, Northwell partnered with six nephrology practices in four counties in the New York City area (Manhattan, Nassau, Queens, and Suffolk counties). Many of the practices operate multiple locations, so Healthy Transitions is currently available at 13 sites.

The Healthy Transitions program is a disease management program for individuals with advanced kidney disease (AKD)—that is, stages 4 and 5.[2] The program excludes individuals who have reached ESRD or dialysis. To be eligible for the program, participants must be covered by a nonmilitary payer (Medicare, Medicaid, or commercial insurance) and meet the following criteria: (1) be at least 18 years old; (2) live in one of the four specified New York counties; (3) have an estimated glomerular filtration rate (eGFR) of less than 30 ml/min;[3] and (4) have no clinically apparent cognitive impairment.

Healthy Transitions focuses on changing participant and provider behavior by shifting the current nephrologist-based care model to a greater reliance on nurse care managers, who can cultivate more personal relationships with the participants and guide them through the complex care system. The interventions focus on improving patient education, helping patients choose and prepare for renal replacement therapy (RRT), and counseling on advance directives. The care model includes annual home visits by registered nurse (RN) care managers to evaluate a patient's home environment and family support. Nurse care managers work closely with the nephrologists and other physicians to support participants in managing the disease and helping them obtain additional care and resources. Each nurse care manager is assigned responsibility for participants in one county. The nurse care managers are supported by an informatics system that creates daily reports on their participant roster. The reports alert them to changes in weight, medication, and whether the participant has selected an RRT modality or not.

Program leaders have projected that the program will serve 500 participants over the three years of the cooperative agreement. During the first two program years, enrollment has been lower than projected, in part due to unexpected delays in bringing aboard two practices in the first year and to Healthy Transitions staff turnover in the second year. The awardee's goals for the program are to (1) improve patient education and shared decision making regarding dialysis and transplantation; (2) increase the percentage of individuals with AKD who actively choose

[2] Chronic kidney disease severity is categorized into five stages, with stage five being the most severe. See https://www.kidney.org/atoz/content/gfr.

[3] The eGFR is a blood test that indicates how well the kidneys are filtering. An eGFR of 60 or higher is in the normal range, below 60 signifies kidney disease, and 15 or lower means kidney failure. See https://www.niddk.nih.gov/health-information/health-communication-programs/nkdep/learn/causes-kidney-disease/testing/understand-gfr/Pages/understand-gfr.aspx.

and prepare for home dialysis modalities and pre-emptive kidney transplants[4] in order to improve their quality of life; and (3) reduce by 30 percent the total cost of care in late-stage kidney disease, largely through reductions in hospitalization, emergency department (ED) utilization, and costly and harmful delays of dialysis treatment. To check progress toward these goals, program leaders monitor 13 measures on a regular basis—including, whether participants have completed education; chosen an RRT modality; started hemodialysis with a working arteriovenous (AV) fistula,[5] graft, or catheter; started hemodialysis without hospitalization; and received a kidney transplant.[6] In addition, leaders monitor patient quality of life and satisfaction with the program.

The payment model, which is under development, has not been formally approved by CMS. The proposed approach is a per beneficiary per month (PBPM) payment to cover a coordination fee, with bonus or penalty payments for meeting or not meeting quality measures. Table 1 presents the characteristics of the Healthy Transitions program.

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified the following successes achieved by Northwell during the first year of its cooperative agreement:

- Northwell developed a data dashboard to self-monitor internal process and outcome measures.
- Northwell achieved buy-in for the model from clinicians.

We also identified several initial challenges in implementing the Healthy Transitions program and Northwell's strategy for addressing them.

- Northwell continued to bring new practice sites into the program in its second year because of a longer-than-expected time period to launch new sites of service. Northwell continued to work with the practices and their corporate parents to finalize agreements, and once they were finalized, to assign care managers to the new practices.

[4] The term "pre-emptive transplant" is used to describe someone undergoing a kidney transplant prior to going on dialysis. This requires the person to identify a suitable and prequalified compatible living donor. The series of pre-evaluation tests for the recipient and donor can take weeks or months. See http://www.lkdn.org/advantage_pre_emptive_tx.html.

[5] A vascular access needs to be created or introduced for hemodialysis. This is an easily accessible source of a large volume of blood that can be run through the hemodialysis machine and returned to the body. An AV fistula is one type of vascular access. It is surgically formed by linking an artery and a vein under the skin in the arm or leg. Arteries have rapid abundant blood flow, while veins are close to the skin and easy to reach with dialysis needles. AV fistulas are the best and preferred form of vascular access for hemodialysis because they are much less prone to infection and clotting than the alternatives. However, substantial preparation is required for the surgical procedure and the AV fistula may take several weeks or months to heal before it can be used for dialysis. Therefore, planning for an AV fistula has to start months before hemodialysis is needed. See https://www.niddk.nih.gov/health-information/health-topics/kidney-disease/vascular-access-for-hemodialysis/Pages/index.aspx.

[6] Kidney transplants are beneficial because they increase patients' lifespans and improve their quality of life. Although there are short-term costs, there are substantial long-term savings.

- Through the first several months of the program, participants were being referred to the program too late in the progression of their kidney disease, leaving little time to intervene before patients began dialysis. Northwell increased community outreach and physician awareness of the importance of early intervention and timely referrals.

Finally, we identified several early lessons learned by Northwell in implementing its program.

- Engage both physicians and patients in the program. For example, to provide the best opportunity for the patient to benefit from the intervention, including AV fistula placement for dialysis, participants must be referred to the program early enough in the disease progression.
- Include a conservative care model as a modality—that is, a model in which participants with ESRD forego dialysis and receive only palliative care—because dialysis is not an appropriate modality option for all participants.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Northwell made progress in the following areas:

- Enrollment fell somewhat below projections, with 395 participants compared to the projection of 490 participants by the end of Year 2. [7] This represents 81 percent of the projected number for Year 2, an improvement from Year 1 when enrollment was only 73 percent of the projection.
- The program continued to expand to other sites, but the scope of expansion was limited by staff turnover and difficulty in finalizing business agreements with new sites.
- Other successes included the development of the conservative care model and performance on quality measures such as rates of transplantation.
- Northwell worked with the National Kidney Foundation (NKF) to develop a payment model and participated in a summit with other key stakeholders to refine the model.

Over the past year, Northwell also made several changes to its program.

- Northwell rebuilt the Healthy Transitions database, converting it to a web-based platform to enhance usability and increase access speed.
- Northwell embedded nurse care managers with the practice sites at least one day per week to increase enrollment and enhance relationships with participating nephrologists.

[7] At the beginning of the second program year, Northwell revised its enrollment projections for program Years 2 and 3. Northwell revised enrollment projections for Year 2 up from 413 participants to 490 participants, and revised total three year projections down from 593 to 500.

Below we note the key challenges that Northwell has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- The restructuring of the database has caused difficulties for the nurse care managers to document patient encounters and to input patient data. Nurse care managers can only access the database once per week. Once the updates are complete, nurse care managers should have continuous access to the system.
- Staff turnover had a negative impact during the second program year. Three nurse care managers and a social worker left the program, which slowed enrollment of new participants. Northwell quickly hired new, CKD-experienced replacements; however, orientation and training takes time. A particular difficulty was that a key staff member went on maternity leave, which delayed expansion to the Manhattan sites. (She ultimately decided to leave the organization shortly after our virtual site visit.)

As Northwell enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Northwell leaders do not believe that they will have time to test the payment model prior to the end of the cooperative agreement.
- In order to facilitate sustainability and expansion of the model, leaders suggested to us that a multisite demonstration following the cooperative agreement could be useful in determining the effectiveness of the proposed payment model.
- Program administrators will need to manage staff turnover in order to achieve their enrollment goals.

Table 1. Northwell: Healthy Transitions characteristics at a glance

Program characteristic	Description
Purpose	Healthy Transitions is a patient-centered program that aims to integrate and coordinate all aspects of care for persons with late-stage CKD by (1) focusing on patient education and care management to delay the onset of ESRD and (2) helping patients make informed choices about ESRD treatment that reflect their personal preferences.
Components	• Care management • Shared decision making
Target population	Eligible participants are individuals with late-stage CKD (stages 4 and 5) who meet the following requirements: (1) are at least 18 years old; (2) live in one of four specified NY counties; (3) have an eGFR less than 30 ml/minute; and (4) have no clinically apparent cognitive impairment.
Theory of change/theory of action	Northwell focuses on changing participant and provider behavior by shifting the nephrologist-based care model to a greater reliance on nurse care managers, who can develop more personal relationships with the participants and guide them through the complex care system. The awardee believes that this improved model of disease management will lead to improved outcomes and better preparation for ESRD, which will ultimately lower costs.
Payment model	Value-based payments, bundled or episode payment, capitated payment for care management/coordination services
Award amount	$2,453,742
Launch date[a]	November 17, 2014
Setting	Patients' homes, practice offices
Market area	Urban, suburban
Market location	Manhattan, Nassau, Queens, and Suffolk counties in NY
Outcomes	• Patients better prepared for ESRD care • Increased patient selection of modality • Increased AV fistula rate • Increased quality of life score • Savings to Medicare of $1.9 million (based on the original estimate of 593 participants)

[a]After a planning period, the awardee's program became operational as of this date.

AV = arteriovenous; CKD = chronic kidney disease; eGFR = estimated glomerular filtration rate; ESRD = end-stage renal disease

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Northwell in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 20 through July 14, 2016. For the analyses of Northwell's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at Northwell
- Nephrologists whose practices are based at Northwell's main campus
- Program care managers
- Referring nephrologists in the community

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[8] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

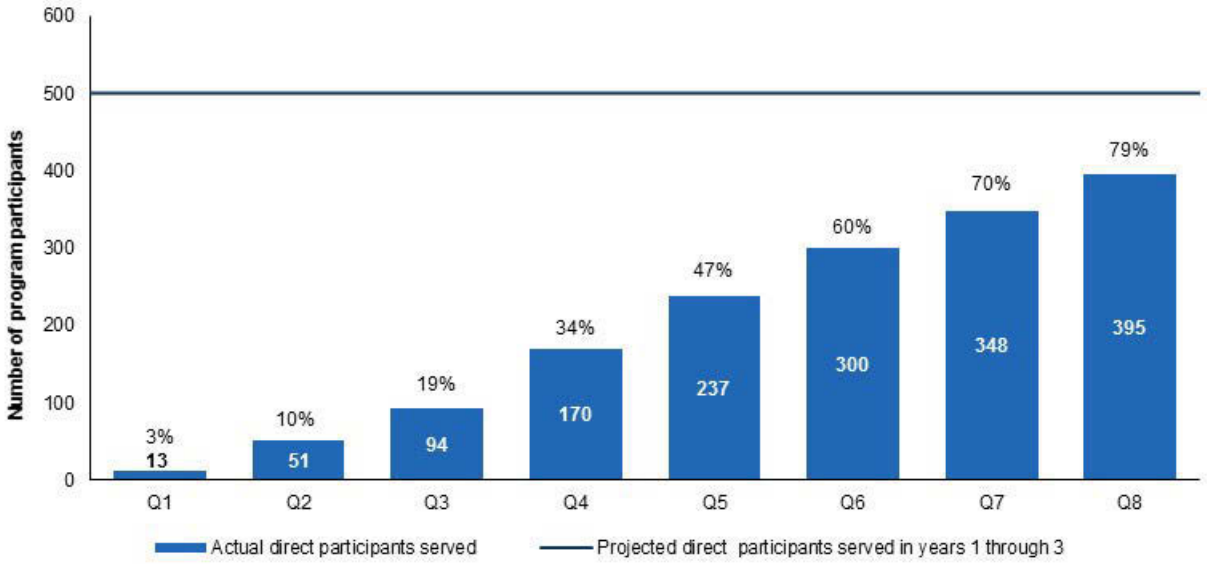
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Northwell's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[8] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Northwell reported to the implementation and monitoring contractors that it directly served 395 participants from November 2014 (the launch of the program) through August 2016, which represents about 81 percent of its 490 projected participants for Year 2 and about 79 percent of its three-year projected total of 500 participants (Figure 1). Interview respondents attributed the lower-than-expected enrollment to unanticipated delays in adding new nephrologists and practices in the first program year, as well as to turnover among key staff in the second program year.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. During program quarter 8 reporting, it was learned that the awardee had been classifying participants served by in-kind-funded RNs as indirect participants in previous reporting quarters. Beginning in program quarter 8, the awardee is now reporting all participants as direct. The data for previous quarters will be updated to report all participants as direct in future reports.

Northwell's progress toward meeting its three-year enrollment goal was influenced by several factors.

1. Facilitators of program enrollment

Participating nephrologists believe in the program. The participating nephrologists recognize the value of the program both to themselves and to their patients. Specifically, they believe in its approach and want to enroll patients in the program.

> "I have been pleasantly surprised by the number of AV fistulas that we have performed and the amount of outpatient dialysis [thanks to] Healthy Transitions' program support. There is an enormous amount of legwork done by the RN staff, and I'm surprised at how smoothly things have gone. It's extremely positive."
>
> *— Nephrologist*

The program's referral base continues to grow in number of sites and geographic reach. Program leaders have successfully recruited private and Northwell Health System-employed nephrologists to participate in the program. Over the past year, one of the program's busiest private nephrologists expanded his referrals to the program from two practices to four practices. In addition, the two nephrologists in Manhattan that were just beginning to enroll patients at the end of the first program year have continued to enroll more patients. Program leaders had a difficult time hiring an RN care manager for the Manhattan territory, which delayed enrollment at the Manhattan sites through the first two program quarters. Without an RN care manager based in Manhattan, Healthy Transitions could not implement the key program component of annual home visits to participants or in-office contact with the nephrologists due to lengthy travel time. The program could not start enrolling patients in Manhattan until there was a dedicated RN care manager to serve the enrolled participants. Manhattan provides a significant opportunity for the Healthy Transitions program to grow because the two nephrologists operate large practices with the potential to enroll many patients.

2. Barriers to meeting enrollment projections

Staff turnover has slowed the program's ability to enroll new patients. During the second program year, three RN care managers left the program (although, one returned to the program four months after resigning). Losing RN care managers poses a problem because the program cannot enroll new participants in the designated territory until a new nurse is hired and trained (training lasts about eight weeks). At the same time, the remaining nurses must cover already-enrolled participants in the former RN care manager's territory, which strains their ability to enroll new participants in their own territories. The planned expansion to Brooklyn was put on hold because of these challenges; leaders are now uncertain whether this expansion will occur during the cooperative agreement. In addition, program leaders commented that, with the end of the grant nearing, the nurses are anticipating potential termination if the program ends and therefore are searching for more permanent and stable positions.

> "If it comes up from [the staff person who was on maternity leave's] territory that [a patient] is eligible, we'll put them aside for now and tell them that someone will contact them as soon as she's back, because we're not assigned to those territories."
>
> *— RN care manager*

3. Strategies to increase enrollment

Program leaders are looking to the Manhattan sites for growth in the next year. Two nephrologists at large Manhattan practices were actively participating in the Healthy Transitions program at the beginning of the second year after a prolonged delay in joining during the first year. However, near the end of the second year, the enrollment rate stalled after the RN care manager for that territory went on maternity leave. At the end of Year 2 and through Year 3, program leaders expect to make a "major push" for enrollment at the Manhattan sites.

RN care managers are embedded in each practice for a full day at least once per week. In the second program year, Northwell negotiated with participating practices to allow RN care managers to be in their offices at least one day each week. Although many aspects of this change were beneficial to the program, the primary purpose was to increase enrollment by having as much access to patients as possible. When the nurse care managers are in the office, they can see which patients are coming in that day and talk with the nephrologists about potential participants. If a nephrologist recognizes the patient as a good fit for the program and refers the patient to the program, then the nurse is there to explain the program to the patient and the patient's family, answer any questions, and enroll the patient on the spot.

> "If we don't go to the offices, we don't get the patients."
>
> *— RN care manager*

B. Implementation of the service delivery model

Our assessment is that the Healthy Transitions program has continued to be implemented effectively and that staff are generally satisfied with the program's progress. For example, leaders are pleased with the number of kidney transplants. The program has a 10 percent transplant rate, compared to the national average of about 1 percent. In addition, leaders informed us that the Kidney Disease Quality of Life survey of participating patients indicated a satisfaction rate of 97 percent with the Healthy Transitions program.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of Healthy Transitions have created both advantages and challenges in implementing the program. An advantage is that the Healthy Transitions program has the support of the larger Northwell Health System. The health system financially supported the pilot program that began in 2012 by funding care managers and helping to support the nephrologists in aligning their financial incentives with the program's purpose and goals. Throughout the HCIA R2 cooperative agreement, the health system has continued to financially support some of the program's RN care managers as well as the system-employed program administrators and nephrologists. Financial support from the health system is essential to the program's operation because the current fee-for-service (FFS) payment structure provides no reimbursement and therefore no incentive for nephrologists to spend time on patient education on the advantages of AV fistula placement or kidney transplantation, or arranging for AV fistulas or transplantations.

> "HCIA has been a test of our ability to extend out and work with other nephrologists in the community and different geographies. . . . The further the care model goes to working with outside doctors, the more important it is to have a payment model that helps align the interests of providers."
>
> *— Program leader*

Nurse care managers and social workers also participate in hospital-wide training and education seminars that cover topics such as advanced chronic illness.

A challenge is that the absence of a validated payment model compromises the ability to scale and expand the Healthy Transitions program. Although the health system and the HCIA R2 cooperative agreement have helped align nephrologist financial incentives with the goals of the Healthy Transitions program, without an appropriate payment model the program leaders believe that the program will not be successful beyond the cooperative agreement. Proper financial incentives are critical to drive quality outcomes such as advanced RRT modality selection and pre-emptive transplants. The current FFS payment structure does not adequately reimburse for or support this type of pre-ESRD care.

2. Implementation processes

During the second program year, Healthy Transition leaders implemented two changes to the program's design: (1) restructuring the Healthy Transitions database, and (2) embedding the RN care managers with the nephrologists' offices on a weekly basis. In addition, program team members strengthened the supports for the conservative care management modality—a palliative care approach to ESRD—that was added in program Year 1.

a. New Healthy Transitions database

The Healthy Transitions informatics and tracking system (the Healthy Transitions database) is a critical tool for implementation of the Healthy Transitions program. Program staff closely monitor the progress of the program with data that are collected in the database, including enrollment, enrollment by nephrologist, patient contacts, patient health and disease progression, and the program's 13 quality measures. Shortly after the HCIA R2 cooperative agreement started, program staff encountered issues with access speed to the database, which prevented the RN care managers from entering information or looking up patient charts in a timely manner. Program staff who needed to access the database were often forced to do so in off-hours (early in the morning or later at night), sometimes days after seeing a patient.

> "One of the things that we came to realize—and we had been discussing it since the beginning—was that the database really just didn't have enough performance ability for the increase in the patient load."
>
> *— RN care manager*

Program leaders used carryover funds from Year 1 to rebuild the Healthy Transitions database to enhance access speed, improve usability, and support program scalability. Northwell hired a database specialist, in collaboration with the corporate Northwell Health System, to rebuild the original Microsoft Access database into a web-based Oracle database. The new database will include many enhancements to aid scalability of the program. Specifically, hosting the database on a web-based platform allows it to be accessible to all participating practices regardless of their electronic medical record (EMR) system, which is critical because the Healthy Transitions program operates across practices that use different EMR systems.

All program staff provided continuous input into the design of the new database. They used the software development opportunity to redesign documentation and tracking processes to increase the database's effectiveness and usability. Staff, including leaders, partnering nephrologists, and RN care managers, attended meetings regarding the database and were strongly encouraged to provide input. For example, features that existed in the old database that staff never used were eliminated, while information that the nurses previously had to input by hand are now incorporated as check boxes.

Data documentation at the point of care, however, has been hindered by the database restructuring. While the database is being restructured and moved to a more powerful platform to address poor performance and access speed, RN care managers are assigned one day to document a week's worth of notes and patient information. They use paper notes until their assigned day to use the database. This has proven to be time-consuming for the care managers. One care manager also noted that not being able to access the database at the point of care has made it harder to track participants and the level of effort put forth by the nurses, because of the difficulty of keeping track of a week's worth of contacts on paper notes; information is lost because it is not documented electronically at the point of care.

> "We do everything twice. . . . We first write it down as it's happening. And then we, later on, either later that week or later that day, we actually put it in the patient's chart. It's excruciatingly time-consuming."
>
> *— RN care manager*

b. RN care managers in the practice

To increase access to and contact with participants, RN care managers are now physically in the offices of the nephrologists they support for at least one day per week. During the second program year, Healthy Transitions leaders pushed for this. The idea was not new to program leaders. During the pilot program, nurse care managers were assigned to two offices, where they worked all day. But as the program expanded for the HCIA R2 cooperative agreement and issues arose with the database's speed outside of the program's main office during program Year 1, the nurses spent more time in the main office and less time physically at the practices. In addition, nurses did not feel as comfortable in the private nephrologists' offices as they did in system-owned offices. One nurse care manager commented that "the offices weren't extremely forthcoming with space for us to feel at home. It was a lot of in and out. . . . The coordination was becoming difficult."

> "We're really going out there and developing those relationships with them, and they're forced, and we're forced. I think it's really been a great thing, since I've come back I've loved it."
>
> *— RN care manager*

During the second program year, leaders asked participating nephrologists to accommodate the nurses and required the nurses to stay in the practice. This change encouraged care managers and nephrologists to develop their relationship, and it appears that relationships between the RN care managers and the participating nephrologists improved.

> "Without [the care manager who was on leave] at the sites, things have slowed down. You really need an in-person presence for this program to work."
>
> *— Nephrologist*

Embedding nurses facilitates (1) improved relationships between nurses and nephrologists, (2) more frequent in-person contact between the nurses and current participants, (3) identification of potential participants, and (4) immediate enrollment into the program during a nephrologist visit.

c. Conservative care management modality

In program Year 1, Healthy Transitions program staff introduced a conservative care management modality as an alternative to dialysis. In conservative care management, patients facing impending ESRD decline dialysis and receive palliative care. During the second program year, a dedicated workgroup consisting of a nephrologist with special palliative care training, a nurse practitioner, and a social worker continued to develop and build the initiative to support participants who select conservative care management.

> "It's very easy for a patient to say 'I never want dialysis.' I think most people say that the first time around. I don't write that their choice was conservative care until the doctor confirms this plan, and that the patient really understands and is willing to write it down in a living will."
>
> *— RN care manager*

The workgroup developed protocols and processes to support nurses' and nephrologists' discussions with patients and families about this option. Talking to a patient about conservative care management may involve more education and conversation than with the other modalities. This is because it is difficult for patients and their families to understand what it means to give up dialysis and what life would look like.

> "I do think there's much more family involvement with conservative care than there is with the other modalities. I think a lot of time is taken . . . speaking with families when it comes to conservative care. The patients need teaching, and the families need more teaching than the patients do."
>
> *— RN care manager*

Since introducing the modality, conservative care management has been appealing to certain patients. Of 238 participants with eGFRs below 20 as of June 2016, 13 percent opted for conservative care management. (People with an eGFR between 15 and 29 are classified as Stage 4 ["severe"] of the five stages of CKD; ESRD is Stage 6).

3. Organizational and external context

The political, policy, and insurance environment within which Healthy Transitions operates continues to have a profound influence on the implementation of the model in the "real world." One promising development is that there are several organizations both within and external to the Northwell Health System that could help the growth of the Healthy Transitions program. For example, program leaders have identified several potential partner organizations within Northwell Health System, including the following:

- Care Solutions, an internal division within the Northwell Health System, addresses high-risk and high-cost patients in managed care contracts. Healthy Transitions staff help Care Solutions manage CKD stage 3 patients. The program could also potentially receive referrals from Care Solutions for patients with AKD (patients with stages 4 or 5 CKD).
- Northwell Health System launched a Shared Savings Program known as the Northwell Health Accountable Care Organization (ACO) in January 2016 that has 50,000 beneficiaries. The ACO has financial and quality incentives to refer patients to Healthy Transitions so that they will receive efficient and high-quality care.
- CareConnect, a health maintenance organization owned by Northwell Health System, may also be a source of referrals.

Organizations external to Northwell Health System that program leaders stated may be helpful to Healthy Transitions include the following:

- Healthfirst, a health insurance company that Northwell works closely with, is at full risk for about 170,000 beneficiaries. Program leaders hope there are opportunities to establish relationships with the insurer's programs to provide care management services for kidney disease patients and to identify potential program participants.
- The NKF continues to gather support for payment reform for CKD care among key national stakeholders.

C. Development of the payment model

According to program leaders, expanding the Healthy Transitions program outside of the Northwell Health System requires a payment model that offers sufficient incentives to the nephrologists to provide the desired approach to care. The expected success of Healthy Transitions relies on the attention of dedicated nurse care managers to guide the participant through AKD and ease their transition to ESRD. The care model also requires involvement from the nephrologist and continued interaction between the nephrologist and the care manager.

During the second program year, leaders finalized the payment model that they think best aligns with the major processes of care. In the first program year, program leaders developed a payment model with help from NKF that provides a PBPM payment to the nephrologist for patients with AKD in stages 4 or 5, a coordination fee paid to the nephrologist, and penalty or bonus payments for the nephrologist based on the results for meeting a set of quality measures. During the second program year, leaders participated in a roundtable meeting with NKF and others to develop an AKD payment model. They subsequently finalized the payment model. However, it appears unlikely that the payment model will be implemented before the end of the cooperative agreement.

Program leaders continued to solicit support for the designed payment model over the past year. In addition to the roundtable discussion with major stakeholders, Northwell plans to partner with DaVita Healthcare Partners[9] to test the payment model.

The awardee submitted the payment model to CMS in September 2015, but program leaders said they have not yet received feedback on their proposal.

[9] DaVita Healthcare Partners Inc. is one of the largest kidney care companies in the United States. They operate nearly 2,300 outpatient hemodialysis centers nationwide. See https://www.davita.com/about.

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IV. FINDINGS FROM ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our third summary of the baseline characteristics of the treatment group. For the purposes of this report, the Northwell treatment group consists of Medicare FFS beneficiaries who were enrolled in the awardee's program between November 17, 2014, and May 31, 2016. In the future, the Medicaid sample may be large enough to detect an impact on key outcomes; if so, these data will be included in the impact evaluation once they are available.

A. Baseline characteristics of treatment group

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS (both Parts A and B), with Medicare as the primary payer when the beneficiaries' eligibility for awardee-provided services began (that is, their enrollment date) and who met all evaluation criteria for a period of at least 90 days during the baseline year (the 365 days immediately before their enrollment). The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. Of the 348 persons in the finder file, 111 were Medicare beneficiaries. Fourteen of these beneficiaries were not enrolled in FFS in the 90 days prior to enrollment, which left us with the 97 participants who were included in the analysis of baseline characteristics for this report.

The demographic characteristics of program participants are similar to those of Medicare FFS beneficiaries nationally (Table 2). Most participants are either 75 to 84 years old (33 percent) or 65 to 74 years old (30 percent). Most are male (54 percent) and white (66 percent). Fifteen percent of participants are dually eligible for Medicare and Medicaid compared with a national rate of 18 percent.[10]

[10] For national average rates, see the report on Medicaid enrollment from the Medicare Payment Advisory Commission and the Medicaid and CHIP Payment and Access Commission at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-section-4-dual-eligible-beneficiaries.pdf?sfvrsn=0.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 97)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	16	16
65 to 74	29	30
75 to 84	32	33
85 and older	20	21
Gender		
Female	45	46
Male	52	54
Race		
White	64	66
Black	20	21
American Indian, Alaska Native, Asian/Pacific Island American, or other	9	9
Hispanic	3	3
Original reason for Medicare eligibility		
Old age and survivor's insurance	65	67
Disability insurance benefits	28	29
ESRD[a]	4	4
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	15	15
HCC score[c]		Statistic
Mean		2.66
25th percentile		1.65
Median		2.37
75th percentile		3.33

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the initial intake visit by the RN care manager takes place. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; HCC = hierarchical condition categories

Despite the demographic similarity of Northwell participants to the overall Medicare population, their utilization and care needs appear to be substantially greater than average. The mean hierarchical condition category (HCC) risk score of participants (2.66) is more than 2.5 times higher than the average for Medicare FFS beneficiaries nationally (approximately 1.00). Nearly all of the participants have HCC risk scores higher than the national average.

Participants had high and rising rates of service use and Medicare expenditures in the baseline year. The baseline utilization and expenditure data for a common set of measures are shown in Table 3. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $2,353—far above the U.S. average of $792.[11] Average PBPM Medicare payments for inpatient ($1,043) and physician ($665) services were the largest drivers of the total cost of care. Since the last report, these mean estimates have gone down, suggesting that recent participants are less costly and/or healthier.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

		Expenditures and utilization for each quarter in the 12 months before enrollment			
Types of expenditures and utilization measures	12 months before enrollment	Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	97	91	93	97	97
Average Medicare expenditures PBPM[a]					
Total	2,353 (389)	2,118 (459)	2,652 (646)	1,685 (418)	2,944 (506)
Acute inpatient	1,043 (291)	770 (240)	1,236 (465)	625 (309)	1,526 (366)
Inpatient other[b]	90 (48)	255 (169)	116 (115)	0 (0)	0 (0)
Outpatient[c]	173 (25)	184 (42)	142 (31)	184 (50)	181 (30)
Physician services	665 (60)	590 (59)	610 (65)	577 (69)	873 (85)
Home health	107 (22)	72 (35)	141 (46)	90 (34)	124 (37)
Skilled nursing facility	206 (76)	186 (131)	346 (173)	118 (78)	178 (88)
Hospice	9 (9)	0 (0)	0 (0)	37 (36)	0 (0)

[2] For national average rates, see the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation" at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed May 1, 2016.

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Durable medical equipment	59 (17)	61 (20)	61 (17)	55 (18)	61 (17)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	940 (198)	484 (151)	963 (271)	674 (227)	1,608 (314)
Outpatient ED visits	449 (84)	440 (146)	569 (146)	337 (117)	454 (142)
Observation stays	32 (18)	88 (62)	0 (0)	42 (41)	0 (0)
Primary care visits in any setting	8,226 (1,334)	6,066 (751)	8,094 (1,376)	7,957 (1,771)	10,639 (1,542)
Primary care visits in ambulatory settings	5,609 (527)	4,835 (620)	5,731 (638)	5,263 (728)	6,557 (842)
Specialist visits in any setting	29,582 (2,389)	26,462 (2,849)	27,519 (2,632)	25,218 (2,385)	38,722 (3,543)
Specialist visits in ambulatory settings	22,328 (1,532)	20,176 (1,852)	21,481 (1,869)	20,503 (1,682)	26,928 (1,817)
Measures of any health care utilization					
Percentage with a hospital admission[d]	52 (5)	11 (3)	16 (4)	15 (4)	28 (5)
Percentage with an outpatient ED visit[e]	34 (5)	10 (3)	14 (4)	8 (3)	10 (3)
Percentage with an observation stay[f]	3 (2)	2 (2)	0 (0)	1 (1)	0 (0)
Percentage with a 30-day readmission among all discharges	19 (4)	17 (17)	14 (7)	25 (11)	18 (7)
Percentage of participants with a readmission among all participants	8 (3)	1 (1)	3 (2)	3 (2)	3 (2)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

Table 3 *(continued)*

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.ED = emergency department; PBPM = per beneficiary per month

The rate of acute care hospitalizations for participants was 940 per 1,000 Medicare FFS beneficiaries per year during the baseline year (a rate much higher than the U.S. average of 274 per 1,000 Medicare FFS beneficiaries per year[2]); 52 percent of participants had at least one hospitalization during the baseline year. The rate of acute care hospitalizations for participants was highest in baseline quarter 4 (1,608 per 1,000 Medicare FFS beneficiaries per year) compared with baseline quarters 1 through 3 (484 to 674 per 1,000 Medicare FFS beneficiaries per year). About 28 percent of participants had at least one hospitalization during baseline quarter 4.

The rate of ED visits that did not lead to a hospitalization in the baseline year was 449 per 1,000 Medicare FFS beneficiaries per year. The rate of observation stays in the baseline year was 32 per 1,000 Medicare FFS beneficiaries per year. The rate of primary care visits (in any setting) was 8,226 per 1,000 Medicare FFS beneficiaries per year. The rate of specialty visits (in any setting) was 29,582 per 1,000 Medicare FFS beneficiaries per year. All of these rates were higher in baseline quarter 4 than in quarters 1 through 3.

In the baseline year, 19 percent of hospital discharges were followed by a readmission in the 30-day post-discharge window, and 8 percent of Medicare FFS beneficiaries had a hospitalization followed by a readmission in the 30-day post-discharge window.

In the near future, we will expand our reporting of baseline utilization and expenditure characteristics. Subject to receiving data from the awardee, we will, in future reports, include a descriptive trend analysis of how the intervention was implemented, including awardee-specific measures.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Northwell

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	81
Projected Medicaid population with 6 months of program exposure	45
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,948
Likelihood of all-cause hospitalizations	677
MDE sample size requirement to detect 20% effect	
Total expenditures	487
Likelihood of all-cause hospitalizations	169
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Serious concern; we may be not able to identify a strong comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

We do not expect to conduct a rigorous estimate of the impact of the Northwell intervention. The number of Medicare and Medicaid enrollees in the program is simply too small to detect even substantial effects on hospitalization or expenditure.

V. NEXT STEPS

A. Implementation evaluation

As Northwell enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis include (1) evaluating post-intervention effects in the treatment group relative to pre-intervention baseline measurements and (2) evaluating performance on awardee-specific measures before and after the intervention. Since the sample size limits the power of our analyses, we plan to use a descriptive approach. We will produce initial impact estimates for the first one to two quarters of program operations, depending upon data availability, after creating our outcome and explanatory variables. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, care coordinators, health coaches, social workers, health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.25.

NEW YORK CITY HEALTH + HOSPITALS

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MATHEMATICA Policy Research

REPORT

APPENDIX B.14

HCIA Round Two Evaluation: New York City Health + Hospitals

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Emergency Department (ED) Care Management Initiative, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on New York City Health + Hospitals' progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare and Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has New York City Health + Hospitals made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have New York City Health + Hospitals and its sites addressed the issues identified during the first program year? What factors have influenced the awardee's and its sites' ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of New York City Health + Hospital's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Emergency Department Care Management Initiative (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

New York City Health + Hospitals, a public benefit corporation that serves as the public safety net in the city's health care system, received an HCIA R2 award to create the Emergency Department Care Management Initiative at 6 of its 11 hospitals (key program characteristics are shown in Table 1.). The program was launched on September 1, 2014, and is based on the awardee's pilot program in ED care management. Adults who visit the ED, meet the enrollment criteria, and give their consent for enrollment receive care management and 90-day coordination of supportive ambulatory care. The care management and care coordination are expected to reduce hospital and ED use (including repeat ED visits and hospital readmissions), especially for ambulatory-care sensitive conditions, and lead to better control of chronic conditions such as diabetes. To be eligible for the program, a patient who is in the ED must be able to be discharged from the ED safely and have either (1) visited the ED for an ambulatory care–sensitive condition (ACSC), or (2) met particular utilization-based criteria (e.g., had another recent ED visit or hospitalization), or (3) been referred to the program by an ED clinician.

Care management is handled by nurses, who generally use data in electronic medical records (EMRs) or talk to on-duty ED clinicians to identify potential participants while they are still in the ED. After enrolling participants in the program, the nurse care managers do a risk assessment, create an ambulatory care plan, and coordinate referrals to other providers. The nurse care manager may also link participants to other members of the care team, such as the home care intake nurse (for an initial assessment of home care needs and establishment of home care, if appropriate) or a pharmacist (for medication management in the ED). Care management staff try to schedule a follow-up primary care visit for the participant, and the nurse care manager calls the participant within 24 to 72 hours after discharge to check in. Thereafter, community liaison workers (CLWs) provide transitional care coordination, mainly via phone calls. The CLWs remind participants of upcoming primary care visits and follow up with them after these visits. They also link participants to other providers and resources, and check in with the participant at 30, 60, and 90 days post-enrollment (when the intervention ends). The program is tailored to local needs and capacity, so the roles and responsibilities may vary somewhat from one site to another. Some tasks typically performed by CLWs may be assumed by care managers, and vice versa. The staffing model includes five nurse care managers and one CLW at each site. Each site also has a physician advisor who engages ED clinicians, educates them about the program, and helps the care management team address other programmatic challenges.

New York City Health + Hospitals has some capitated or value-based contracts, which have been in place since before the program. The awardee is performing and refining analyses to develop a payment model for the program. The awardee also is developing a similar program under its Medicaid Delivery System Reform Incentive Payment (DSRIP) program at its five other hospital sites. In the future, it might use DSRIP to fund ED care management at the sites currently funded by the HCIA R2 award. Ultimately, the awardee's goals are to (1) reduce unnecessary ED visits and hospitalizations and (2) improve participants' linkage with and access to primary care and community-based services.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by New York City Health + Hospitals during the first year of its cooperative agreement.

- After a slow start, the ED Care Management Initiative began to meet its monthly enrollment targets. It was fully staffed at all six sites, and eligible individuals appeared to be receptive to the idea of joining the program.
- Site-based physician advisors who are program champions have educated ED clinicians and New York City Health + Hospitals leaders about the program, facilitated referrals to the program from clinicians, and conveyed to staff that the program is a priority for the awardee.

We also identified several initial challenges in implementing the program and New York City Health + Hospitals' strategies for addressing them.

- Enrollment levels were initially lower than projected because of delays in hiring staff who would have been recruiting participants and providing care management. Bureaucratic hiring processes were a key barrier to timely hiring.
- Even with a fully staffed program, it was a heavy burden on some program staff to carry out their responsibilities with such a large number of participants. (The program has an enrollment target of over 3,000 participants per month, which corresponds to an average caseload of over 500 new participants per month per CLW and over 100 per care manager.) Insufficient staffing for follow-up telephone calls, as well as burdensome documentation requirements and data systems, were identified as key challenges. Program leaders were working to provide a more efficient database and were considering hiring additional staff.
- Although timely access to primary care for new participants is a critical component of the program, it was not always accomplished, and this remained a significant barrier to program implementation. Program staff partnered with the ambulatory care program at New York City Health + Hospitals to identify better pathways to care for program participants.

Finally, we identified several early lessons learned by New York City Health + Hospitals in implementing its program.

- Program leaders recognized in the early days of implementation that the program was not adequately standardized at the different sites, and they developed governance structures and other strategies to facilitate cross-site information sharing and standardization of practices.
- It was challenging for New York City Health + Hospitals to follow through with its early plans to use care management to safely divert participants from a hospitalization from the qualifying ED visit. Some staff therefore focused on enrolling participants whose ability to be safely discharged from the ED did not depend on program participation. Instead of trying to help patients avoid being hospitalized from the qualifying ED visit, these staff focused on helping participants avoid repeated ED use and hospitalization in the future.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, New York City Health + Hospitals made progress in the following areas:

- After a slow start early on, the ED Care Management Initiative came closer towards meeting its enrollment targets during Year 2, and served a total of 61,025 direct participants during its first two years. Key reasons for this were the program's achievement of full staffing levels for care management and the staff's prioritization of meeting the enrollment targets.
- In Year 2, New York City Health + Hospitals worked to enhance the effectiveness of its program. For example, the awardee provided a multi-day training for care management staff, leveraged its workgroups of pharmacists and physician advisors to share best practices between sites, and used data analyses both centrally and at the sites.
- The awardee performed preliminary cost savings analyses based on claims data for some participants. It continues to refine its analysis and work on obtaining and analyzing claims data from additional payers.

Over the past year, New York City Health + Hospitals made no major changes to the program, but it did make several minor changes:

- To improve the efficiency of its data documentation, the awardee purchased laptops and tablets for care management staff. In addition, some sites implemented the newly acquired Epic EMR, which has helped the care management staff to more easily document data and has made data more available.
- Some sites have developed and implemented new processes to improve care coordination by, for example, implementing a new process to facilitate the timely initiation of home care and processes to improve participants' access to primary care.

Below we note the key challenges that New York City Health + Hospitals has worked to address in the second year of its cooperative agreement.

- The number of enrollees and the scope of the intervention pose a major challenge in the form of a heavy staff workload—especially for the CLWs. New York City Health + Hospitals was able to allocate some of the requested Year 2 carryover funds to hire one additional CLW at two facilities. The remaining four facilities involved in the intervention were unable to recruit and hire due to time constraints and bureaucratic hiring processes. Instead, as described below, some sites have developed their own strategies to increase staff capacity to perform care management and care coordination. In addition, New York City Health + Hospitals is considering proposing reduced enrollment targets.
- Data documentation for the program continues to pose a challenge, although the rollout of Epic to some sites and the awardee's purchase of tablets and laptops are expected to partly resolve the issue.
- Various sites have worked with primary care clinics internal to New York City Health + Hospitals and, in some cases, with external PCPs, to develop processes to improve participants' access to primary care.

As New York City Health + Hospitals enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee will continue to address the heavy workload of its care management staff, especially the CLWs. The awardee is working to propose reduced projected enrollment targets, which will help alleviate staff burden and increase the amount of time they can spend on each participant. The reduction in targeted enrollment could affect the payment model by changing the projected savings and the cost of the program per beneficiary.
- Executive leaders at New York City Health + Hospitals are engaged in the program and its goals, and they will be implementing a similar program at its hospitals that do not have the ED Care Management Initiative. These actions will help to sustain the leadership and visibility of the program, even as HCIA R2 funding comes to an end.

Table 1. New York City Health + Hospitals: ED Care Management Initiative characteristics at a glance

Program characteristic	Description
Purpose	In order to reduce participants' avoidable hospital and ED use, the ED Care Management Initiative offers care management and 90-day supportive ambulatory care coordination to adult patients who visit the ED for ACSCs, or visit the ED and meet particular utilization-based criteria, or visit the ED and are referred to the program by an ED clinician.
Components	• Care management • Transitional care coordination
Target population	• Adults whose health care can be better managed in order to prevent ED visits and hospitalizations, as indicated by having an ED visit because of an ACSC or meeting particular utilization-based criteria • Priority populations include dual eligibles, high-risk/high-cost populations, and underserved populations
Theory of change/theory of action	Interdisciplinary care management and planning (including linkages to appropriate ambulatory care) and extended care coordination that covers the transition to comprehensive ambulatory care can help ED patients with ACSCs better manage their health care and avoid unnecessary hospitalizations and repeated visits to the ED.
Payment model	Partial or full capitation for medical services (awardee has some global risk contracts that pre-date award and can potentially use cost savings to fund program), capitated payment for care management/coordination of services
Award amount	$17,916,663
Launch date[a]	9/1/2014
Setting	ED with follow-up via telephone
Market area	Urban
Market location	New York City
Outcomes	• Reduced hospitalizations and 30-day hospital readmissions • Reduced 7-day and 30-day repeat ED visits • Better hemoglobin A1c control

[a]After the initial planning period, the awardee's program began to operate as of this date.

ACSCs = ambulatory care sensitive conditions; ED = emergency department

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by New York City Health + Hospitals in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during a telephone interview with program staff on July 8, 2016, and an in-person site visit with program staff from July 25 through July 27, 2016. For the analyses of New York City Health + Hospitals' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct interviews with the following program staff:

- Central program staff, including the project director, principal investigator, data analyst, and financial analyst
- Site-based program staff, including care managers, community liaison workers, home health intake nurses, site leads, a physician advisor, and a pharmacist

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

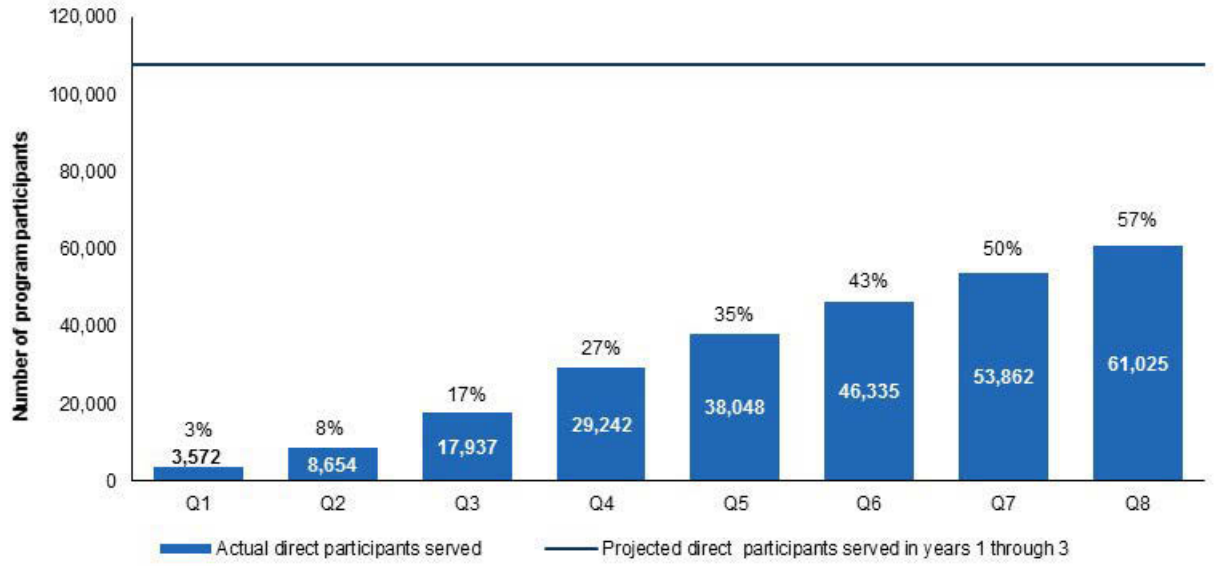
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on New York City Health + Hospitals' implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, New York City Health + Hospitals reported to the implementation and monitoring contractor that it directly served 61,025 participants from September 2014 (the launch of its program) through August 2016, which represents about 57 percent of its 107,646 projected participants (Figure 1). The awardee is, however, considering lowering its three-year enrollment projections, as discussed below. The baseline characteristics of participants who we are able to identify in Medicare and Medicaid enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative direct participants served through Year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. NYC H+H does not have indirect program participants.

New York City Health + Hospitals' progress in meeting its three-year enrollment goals was influenced by several factors, including its staffing model and staff's prioritization of reaching enrollment targets, the success of participant engagement and availability of relevant data about participants, and the relationships between care managers and ED physicians and their effect on enrollment (both positive and negative).

Achieving full staffing and prioritizing enrollment targets were strong facilitators of enrollment in Year 2. As discussed in the first annual narrative, enrollment in the ED Care Management Initiative was low during its initial months. However, once the program was fully staffed, care managers began to come closer to meeting targeted enrollment levels. CMS's feedback to New York City Health + Hospitals about the importance of increasing enrollment prompted the sites to focus intently on doing so. Frontline staff indicated that program and site leaders clearly conveyed that enrollment was a priority, so the care managers spent more time on

identifying potential participants and increasing enrollment. Although this effort was a key facilitator of enrollment, many staff (as discussed below) have felt that the focus on meeting high enrollment targets has negatively affected the quality of care management and the amount of time they can spend with each participant. The awardee is therefore considering decreasing its enrollment projections and is analyzing the projected effects of the decrease on cost savings.

Care management staff also identified several factors related to patients and to the data available to care managers that affected the success of enrollment efforts. Site-based staff described patients as generally receptive to enrolling in the program, which has facilitated enrollment. However, staff also noted that some patients are not interested in care management when they are approached about it because they are focused on getting their immediate needs taken care of by an ED physician (often having waited a long time in the ED to be seen). In addition, although care managers have access to data on diagnosis (which is the primary criterion for eligibility), some other factors that affect a person's appropriateness for the program were more challenging to identify. For example, care managers needed to maintain close contact with the ED physicians to find out if a patient was likely to be admitted (and thus not eligible for enrollment). The care managers also lacked data on whether the patient had recently visited another site's ED and/or had recently enrolled in the program at another site, and realized they had to find out whether a patient was only making a temporary visit to the New York City area. Some program staff thought the broad eligibility criteria allowed them to cast a wide net and thus enroll many participants who might benefit from the program, whereas others suggested that more narrow and targeted enrollment criteria might help target the people who could most benefit from the program (for example, if staff knew the criteria necessary to predict who was at highest risk of repeated ED visits).

> "If [care managers] are at a training or have a day off, [physicians ask], 'Where are they? We need them. They have to help us with these patients. Can't they be here 24 hours a day?'"
>
> *— Site-based staff member*

Many staff identified relationships between care managers and ED physicians at a given site as an important factor affecting enrollment—more often as a facilitator, though sometimes as a barrier. Some care managers and other frontline staff specifically highlighted their strong relationships with ED physicians, who helped facilitate referrals to and enrollment in the program. At sites where the relationships between care managers and physicians were strong, staff talked about their effective communication with ED physicians, told us that physician advisors were well-respected and proactive in engaging other physicians, and described ongoing contact and close proximity with ED physicians—for example, through the physicians' and care managers' regular rounds together in the ED. Although space constraints in the ED often posed a challenge to care managers' enrollment of participants, care managers who had good relationships with physicians established visibility in the ED and had access to eligible patients. At some sites, care managers facilitated enrollment by focusing on and establishing relationships with physicians in areas of the ED for patients with less acute conditions (such as an urgent care section of the ED), where they could easily identify potential participants. Strong relationships between care management staff and physicians often facilitated enrollment, but some care management staff (depending on the site) said that ED physicians were not engaged, not aware of the role of the care management team, and not interested in referring patients. This made enrolling participants more difficult, and care managers had to spend more time reviewing data in order to identify potential participants.

B. Implementation of the service delivery model

New York City Health + Hospitals and its sites continue to be on track with the implementation of its service delivery model and made no significant changes to the model in the second program year. The ED Care Management Initiative has continued to enhance its operations (for example, by training staff, establishing cross-site workgroups, and self-monitoring via data analyses), and address key challenges (such as staff workload, data documentation, and primary care access).

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Many of the people we interviewed told us that they had come to realize that the targeted enrollment numbers are too high for the ED Care Management Initiative's staffing model at each site, especially when it comes to the workload for CLWs. (The staffing model includes only one CLW at each site to perform follow-up on participants enrolled by five care managers.) Staff thought the program was prioritizing quantity of participants over quality of care management, and their suggestions included more staffing, fewer participants, and/or shorter follow-up time in the program (such as going from 90 days to 30 days). To address the issue of CLWs being overextended, New York City Health + Hospitals initially considered using carryover funding from Year 1 to hire additional CLWs. However, the carryover funding was approved only for Year 2 and could not be guaranteed for Year 3. As noted above, two facilities were able to hire one additional CLW each. However, all six facilities employed the resource allocation strategies mentioned in order to address the issue of the workload burden on the core CMMI staff—for example, by having more CLWs that are funded by New York City Health + Hospitals (rather than by the HCIA R2 award), assigning care managers instead of CLWs to perform some follow-up calls, prioritizing some types of follow-up calls, or having additional clerical staff assume the data entry responsibilities of care management staff. However, even at sites that use these strategies, many staff still feel that enrollment targets are too high and that they have compromised the quality and scope of care management and coordination for participants. Some

> "It feels like the goal is more about quantity as opposed to quality. It is like I am trying to race to get all the numbers done, and we are missing on the quality. This is one thing that is a challenge."
>
> *— Care management staff member*

staff also hypothesized that these issues limited the program's impact and were an important reason for why New York City Health + Hospitals has not seen sustained improvement in most of its self-monitoring metrics (such as ED revisit rates and HbA1c control). The awardee is therefore planning to propose lower enrollment targets.

Although most feedback on the staffing model is related to adequacy of staffing, many interviewees also highlighted the strengths of the staffing model, including the value of its interdisciplinary nature. Many care management staff and program leaders identified pharmacists as playing a highly valued role in addressing participants' medication-related issues. Care management staff also indicated that social workers (who are funded by New York City Health + Hospitals and are not formally part of the program's staff) played very useful roles in care management, though some program staff indicated that it would be beneficial to have additional social workers hired by and dedicated to the program. Many program staff view CLWs as playing an important role in following up with participants, although some CLWs said that it can often be challenging to reach and effectively engage participants by phone during the 90-day enrollment period.

2. Implementation processes

In Year 2, New York City Health + Hospitals has worked in a few ways to alleviate the burden of data documentation on program staff, and some progress has been made. As discussed in the first annual report, documenting program data is very time-consuming for staff, is often performed on paper, and is done in the home-grown care management database and/or in EMRs (data are sometimes entered twice). The awardee initially planned in Year 2 to begin using new care management software (GSI), which was being deployed for other programs within New York City Health + Hospitals. However, program staff determined that GSI did not fit the program's workflow and therefore decided not to use it for the program.

The awardee has made some progress in improving documentation by implementing minor changes to its homegrown database and having the central data analyst train staff who are entering data. However, data documentation remains burdensome for program staff, although implementation of Epic, their new EMR, is beginning to address the issue at some sites (see Section B.3 below). New York City Health + Hospitals used carryover funds to purchase laptops or tablets for care management staff so they can complete documentation more efficiently and have better mobility within the EDs. This will also respond to the challenge some staff have in finding available workspace in the ED to do their documentation. Although many staff were optimistic about the expected improvements in access to technology and efficiency of documentation, some expressed concern about the potential intrusion of the process in participant encounters.

In Year 2, the awardee also used carryover funds to have a group affiliated with New York University's Department of Population Health provide multi-day training to the care management staff. Many staff said the training was very helpful in identifying how they can improve their communication skills and interactions with participants. Some staff wished that the training had occurred earlier in the program and thought that the time pressure involved in their roles sometimes made it difficult to implement the lessons from the training. Further, although staff felt that the training they received about communications was helpful, there was still variation in how prepared they felt to address barriers to care. Some staff reported that they did

not know about the appropriate community resources that could help participants, whereas others considered themselves to be knowledgeable and well equipped.

To enhance the program's effectiveness and standardization across sites, New York City Health + Hospitals created cross-site workgroups of pharmacist and physician advisors toward the end of Year 1. Site staff reported that the workgroups were useful in facilitating the cross-site sharing of knowledge and best practices. The workgroups' members have discussed program implementation challenges and possible solutions, reviewed program data and their implications, and shared standardized care pathways for particular diagnoses that are common among participants.

> "We have more people … to produce ongoing reports that we can feed back and create dialogue … really ask questions that we weren't able to ask a year ago … Being able to put data in front of people and say 'Why is this happening?' I think has been really quite powerful."
>
> — *Program leader*

Changes in staffing at the awardee's central office have also affected progress in Year 2, both positively (by facilitating data analysis and use) and negatively (because of a shortage in management staff). The hiring of the data analyst and the financial analyst was delayed, and they did not start until around the beginning of the second year. They accelerated the program's use of data for self-monitoring and improvement. The data analyst regularly provides site-specific reports to the sites, and staff at several sites used these data to analyze individual- and site-level information (such as data on repeat ED visits by participants). Staff at the awardee's central office have also increased their analysis and use of data in Year 2. For example, there have been analyses on repeat ED visits, utilization during and after participant enrollment, characteristics of participants, and the relationship of PCP visits to other utilization measures and outcomes. Although analytical staff capacity has increased, the program has had problems with other project management staffing. A project manager was part of the program for only a short time during Year 2, and another project manager was hired near the end of Year 2. The project director left her position in early July 2016, and the awardee reported working to hire a replacement. Most individuals who mentioned the director's departure said the transition of her responsibilities to existing staff had gone smoothly. However, some staff had concerns about the management of the program and its sites in the absence of a project director. Bureaucratic hiring processes at New York City Health + Hospitals have impeded the timely hiring of replacement staff.

As discussed the degree to which ED physicians engage in the program, which varies by site, affects implementation. Their engagement has also been particularly important to initiating home care for participants, which is handled by the home care intake nurse at each site. To eliminate the barriers to initiating home care, some sites have worked to implement a process in which the ED physician signs off on the initial orders for home care for participants who do not have a PCP. Otherwise, PCPs must sign off on all initial home care orders, which is a challenge because many participants do not have a PCP and, as discussed below, it is difficult for many participants to gain access to one in a timely way. ED physicians at some sites have been reluctant to sign off on orders. Staff at one site reported that the physician advisor had helped to engage ED physicians in this process, but staff at another site reported that they had continued to work only with PCPs in initiating home care orders.

3. Organizational and external context

Some sites made significant progress in streamlining processes to improve access to primary care in Year 2, though participants' access to primary care remains a challenge – with the scope of the problem varying by site. Program staff recognized that much of the program's success depends on participants' access to appropriate follow-up primary care. At one site, program leaders worked with ambulatory care leaders to establish guidelines on which individuals should get PCP appointments within one or two weeks, and reserved appointment slots were established for such appointments. This site's staff reported that visibility of the HCIA R2 program helped them to gain buy-in from ambulatory care leaders, and that the new process also helped non-participants access primary care. Staff at some other sites said they developed close contacts with leaders at primary care clinics, involving them in strategy meetings and contacting them to help troubleshoot issues with access. Still other sites had identified primary care clinics with walk-in hours and educated participants about their availability. The leaders of the larger New York City Health + Hospitals organization as a whole are working to address PCP access across the entire system and are planning to implement system-wide strategies such as borough-wide call centers for PCP scheduling.

New York City Health + Hospitals has made progress with regard to access to primary care, but a few factors have affected the awardee's and the sites' ability to address and monitor the issue. Although the awardee has focused mostly on access to its primary care clinics, stronger challenges in clinic capacity in some areas have motivated some sites to engage with external primary care providers (such as federally qualified health centers). However, New York City Health + Hospitals has timely access only to data from its own primary care clinics, limiting its ability to evaluate who is accessing primary care outside of its system. (Based on the awardee's self-monitoring reports, only about one-quarter to one-third of participants have seen a New York City Health + Hospitals primary care provider during their time in the program, and the share has declined slightly over the course of the cooperative agreement.) It is also noteworthy that the processes for making primary care appointments varies by site, which also affects access. At one site, a CLW attempts to schedule primary care visits for all participants, resulting in a high no-show rate. At other sites, care management staff had more specific guidelines on which participants to schedule appointments for and in what time frame (focusing on those who most need timely follow-up from a primary care provider). The sites that were more selective were able to prioritize access for participants whom they perceived to be most in need.

Program leaders stressed that the program's fit with the awardee's broader strategic vision and goals (including enhancing ambulatory care and care management) and its similarity to other priority programs has helped to engage executive leaders. The awardee is planning to implement a similar Medicaid DSRIP program ("ED Care Triage") in its five hospitals that are not funded by HCIA R2. During Year 2, staff from the ED Care Management Initiative have been meeting with the DSRIP leaders at New York City Health + Hospitals and sharing knowledge and lessons learned. Although actions at the executive level have mostly facilitated the implementation of the ED Care Management Initiative, the

> "From our senior leadership on down, everyone is talking about the fact that we need to move to a system that is less hospital-centric, more ambulatory care-centric, with robust care management and population health interventions."
>
> *— Program leader*

restructuring of the leadership within New York City Health + Hospitals caused turnover and a loss of continuity in the program's executive steering committee. However, one program leader described the new executive steering committee as being "energized" with respect to their work on the program and its fit with awardee's broader vision.

The implementation of Epic by the larger New York City Health + Hospitals organization as its new enterprise-wide EMR is also affecting the program and improving documentation. Two of the sites implemented Epic in Year 2 of the program, and the remaining sites are scheduled to implement it after the program concludes. Program staff who now use Epic reported that its features are useful for the program. For example, Epic allows care managers to document and view more program-related information in the EMR, has drop-down menus that streamline documentation, helps care managers to more easily identify potential participants, and allows care team members to send messages about the participants to each other. The awardee also began a cross-site workgroup on Epic optimization in order to identify and help to implement the functionalities needed in Epic to best support the program.

Finally, care management staff said that program implementation has been influenced by many factors related to the population served by the program and the medical resources available to them. Participants often face multiple barriers to accessing care in the appropriate setting and in following up on their medical conditions; the barriers include a lack of health insurance (about one-third of the participants have been uninsured), low levels of health literacy, and homelessness or housing insecurity. Many staff also believe that effective follow-up with participants was often hindered due to participants providing incorrect contact information (because of issues such as the fear of being contacted about financial, immigration, or legal issues). Staff also pointed out that the participants' habits with regard to using the ED were difficult to influence because the ED was sometimes more accessible, convenient, cheaper, and quicker than alternative sources of care. Therefore, changing these habits and the ways in which participants use ambulatory care—via care management, coordination, and education about the role of primary care—can be challenging.

C. Development of the payment model

During Year 2, New York City Health + Hospitals obtained claims data from some payers. The awardee's own staff, a team of graduate students, and actuaries from MetroPlus have performed preliminary analyses of the cost impacts of the ED Care Management Initiative. (MetroPlus is the awardee's health maintenance organization, which sponsors a number of health plans, including a large Medicaid managed care plan.) New York City Health + Hospitals' relationship with MetroPlus made it easier to obtain detailed claims data. However, the awardee does not have data on services that are not provided by Medicaid managed care plans (such as behavioral health claims), and this has posed a challenge to the analyses. The awardee has also obtained some claims data from another payer and is looking to use the data to replicate its analyses of the MetroPlus data. New York City Health + Hospitals is also working to refine its analysis of MetroPlus claims.

More broadly, awardee leaders are focused on developing analyses that support innovative payment models that promote the transformation of care, including care for uninsured

individuals. The payment reform committee is determining the next steps for creating a payment model or models based on the analyses.

Program leaders are not yet sure what form the payment model will take. New York City Health + Hospitals has global risk contracts with some payers (including MetroPlus) and is thinking about determining the program's return on investment under these payers in order to justify its own continued investment in the program. For other payers, the awardee might use its cost savings analyses to calculate a per beneficiary per month (PBPM) fee to support the program. And as mentioned, New York City Health + Hospitals has a large Medicaid DSRIP award and is considering sustaining the program after HCIA R2 funding ends by rolling it into the similar DSRIP ED Care Triage program.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This summary covers both the common and awardee-specific claims-based outcomes at baseline for Medicare fee-for-service (FFS) beneficiaries in the treatment group who became participants in the awardee's program from September 2014 through May 2016, according to lists from the awardee. To be eligible for the program, a patient who is in the ED must be able to be discharged from the ED safely and have either (1) visited the ED for an ambulatory care–sensitive condition (ACSC); or (2) met particular utilization-based criteria (for example, had another recent ED visit or hospitalization); or (3) been referred to the program by an ED clinician.

A. Baseline characteristics of the treatment group

New York City Health + Hospitals began to enroll participants in its ED Care Management program, including Medicare and Medicaid beneficiaries and those with other types of insurance, in September 2014. As of the end of May 2016, the program had 55,069 unique direct program participants. The awardee estimates that approximately 30 percent of these participants are in Medicaid managed care, 9 percent are in Medicaid FFS, 8 percent are in Medicare managed care, and 6 percent are in Medicare FFS. The remaining participants (approximately 48 percent) are largely uninsured or privately insured, with a small proportion having other types of insurance such as workers' compensation.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, a total of 2,136 participants were included in the analysis of baseline characteristics for this report.

This report also presents (1) prevalence estimates of ACSCs; (2) the proportion of those without ACSCs in the baseline period; and (3) total Medicare expenditures per beneficiary per month (PBPM), stratified by each ACSC present among participants as well as for those with and without ACSCs. We used a list of 16 targeted ACSCs and corresponding diagnosis codes that the awardee developed to identify and monitor the mix of participants in its program. Initially, the awardee targeted ACSCs based on the Prevention Quality Indicators (PQI) from the Agency for Healthcare Research and Quality. However, as the program progressed the awardee modified and added to the PQIs in order to better identify the population that would benefit most from the intervention. For this report, we use the awardee's definitions in order to keep our reporting aligned with how New York City Health + Hospitals identifies and classifies its program participants.

Our analysis of baseline characteristics indicates that the awardee is recruiting a demographically diverse population with significant health care needs and high Medicare expenditures (Table 2). Thirty-three percent of the program's participants are younger than 65, whereas 8 percent are 85 or older. Forty-two percent of the participants originally enrolled in Medicare because of a disability, which is significantly greater than the national rate of 24 percent (based on a 5 percent Medicare sample from 2015). Two percent of participants have end-stage renal disease (ESRD). Participants are more likely to be female (58 percent). Only 29 percent of participants are white (significantly lower than the 80 percent of beneficiaries nationwide who are white)—reflecting the racial composition of the four New York City boroughs in which the participating hospitals are located. Fifty-four percent of participants are dually eligible for Medicare and Medicaid, which suggests that they have a high level of social need considering that 18 percent of beneficiaries nationwide are dually eligible. Participants have substantially poorer health status and greater needs for care than the general Medicare FFS population, as evidenced by the fact that their average hierarchical condition categories (HCC) risk score is 44 percent higher than that of the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 2,136)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	705	33
65 to 74	788	37
75 to 84	476	22
85 and older	167	8
Gender		
Female	1,239	58
Male	897	42
Race		
White	624	29
Black	945	44
American Indian, Alaska Native, Asian/Pacific Island American, or other	210	10
Hispanic	317	15
Original reason for Medicare eligibility		
Old age and survivor's insurance	1,185	55
Disability insurance benefits	903	42
End-stage renal disease (ESRD)[a]	48	2

Table 2 *(continued)*

Characteristics	All participants (N = 2,136)	
	Number	Percentage
Hospice[b]	2	0.09
Medicare/Medicaid dual status, percentage dual[b]	1,144	54
HCC score[c]		Statistic
Mean		1.44
25th percentile		0.69
Median		1.09
75th percentile		1.76

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary consented to participate in the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

The participants had high Medicare expenditures and high rates of service use in the year prior to enrollment, which was consistent with their demonstrated needs. In Table 3, we report baseline expenditure and utilization data for a common set of measures, including the four core measures from CMMI. We examined baseline cost of care by calculating average PBPM[3] Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $2,072—substantially higher than the 2014 national average of $792.[4] Average PBPM Medicare payments for inpatient ($1,185), outpatient and ED visits ($337), and physician visits ($284) were the largest drivers of total cost of care.

Participants had high average use of expensive Medicare services prior to the index ED visit that precipitated enrollment in the awardee's program. The annual rate of acute care hospitalizations was 919 per 1,000 Medicare FFS beneficiaries in the treatment group during the baseline year—well above the national annual average of 276 per 1,000 Medicare FFS beneficiaries in 2014. Furthermore, for program participants, the annual rate of ED visits not

[3] The months referred to in our calculations are 30-day periods rather than calendar months.

[4] The national data presented here and in the next paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

leading to a hospitalization was 3,663 per 1,000 Medicare FFS beneficiaries, and the annual rate of ambulatory observation stays was 87 per 1,000 Medicare FFS beneficiaries. Not surprisingly, the 2014 national annual rate of ED visits not leading to a hospitalization was considerably lower at 454 per 1,000 Medicare FFS beneficiaries, a difference that reflects the program's recruitment of frequent ED users for care management. In fact, 91 percent of participants had an ambulatory ED visit in the last quarter of their baseline period. Given that an ambulatory ED visit with a discharge to home is a criterion for participation, we will explore why 8 percent of participants did not have a qualifying ED visit or observation stay before we draw the comparison group. The likelihood of a 30-day readmission for program participants was also high (37 percent among discharges) compared with the 2014 national average for Medicare FFS beneficiaries (18 percent). Thus, there is an opportunity to reduce potentially avoidable ED visits and readmissions, during both the 90-day intervention period and beyond, through enhanced access to follow-up care. At baseline, the annual rate of primary care visits for program participants (4,902 per 1,000 Medicare FFS beneficiaries) was substantially lower than their rate of specialty service use (11,101 per 1,000 Medicare FFS beneficiaries). This may suggest a need for greater access to primary care, which is a focus of the program. On the other hand, given the health care needs of this population, the high rates of specialty care use may be appropriate.

In the last baseline quarter relative to the previous three quarters, we observed a steep increase in average PBPM total payments (29 percent) and average PBPM payments for inpatient (33 percent), outpatient (46 percent), and physician services (24 percent). We observed a similar trend in rates of hospitalizations, ED visits, observation stays, primary care visits, and specialty services. Expenditures for skilled nursing facilities decreased in the fourth baseline quarter relative to the three preceding baseline quarters, but this may reflect a relatively short claims run-out period. In sum, beneficiaries targeted for this intervention were high-cost and high acute care users both during the year prior to enrollment and in the quarter immediately before enrollment. This trend has important implications for selecting a comparable cohort of Medicare FFS beneficiaries as the comparison group.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	2,136	1,983	2,042	2,133	2,136
Average Medicare expenditures PBPM[a]					
Total	2,072 (91)	1,885 (120)	1,900 (121)	1,984 (112)	2,473 (123)
Acute inpatient	1,185 (67)	1,075 (86)	1,076 (93)	1,106 (86)	1,449 (98)
Inpatient other[b]	88 (13)	62 (18)	81 (21)	102 (23)	104 (23)
Outpatient[c]	337 (16)	296 (21)	300 (20)	306 (19)	439 (20)
Physician services	284 (12)	259 (13)	265 (13)	277 (15)	331 (14)
Home health	59 (5)	47 (6)	66 (9)	55 (6)	67 (7)
Skilled nursing facility	103 (14)	134 (45)	97 (41)	124 (24)	61 (14)
Hospice	4 (3)	0 (0)	3 (3)	3 (3)	7 (4)
Durable medical equipment	13 (1)	12 (1)	11 (1)	12 (2)	17 (3)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	919 (54)	800 (62)	854 (65)	903 (65)	1,099 (69)
Outpatient ED visits	3,663 (272)	2,455 (283)	2,365 (219)	2,807 (323)	6,757 (309)
Observation stays	87 (9)	35 (8)	50 (11)	67 (16)	188 (21)
Primary care visits in any setting	4,902 (191)	4,598 (220)	4,769 (227)	4,924 (255)	5,260 (239)
Primary care visits in ambulatory settings	3,441 (122)	3,358 (154)	3,408 (161)	3,472 (150)	3,504 (147)
Specialist visits in any setting	11,101 (435)	10,590 (483)	10,519 (466)	10,903 (504)	12,271 (526)
Specialist visits in ambulatory settings	7,010 (226)	6,966 (276)	6,939 (270)	6,934 (265)	7,184 (274)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	35 (1)	13 (1)	14 (1)	14 (1)	16 (1)
Percentage with an outpatient ED visit[e]	91 (1)	24 (1)	24 (1)	25 (1)	85 (1)
Percentage with an observation stay[f]	7 (1)	1 (<0.5)	1 (<0.5)	1 (<0.5)	4 (<0.5)
Percentage with a 30-day readmission among all discharges	37 (1)	34 (3)	33 (2)	40 (2)	35 (2)
Percentage of participants with a readmission among all participants	9 (1)	3 (<0.5)	3 (<0.5)	4 (<0.5)	5 (<0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. ACSCs among treatment group members and potential comparison group members

Because the initiative provides comprehensive care management to adult patients with ACSCs for 90 days following an ED visit, we examined the prevalence of the most common ACSCs among participating Medicare FFS beneficiaries. Table 4 shows the prevalence of awardee-defined ACSCs that we identified in the baseline year among participating Medicare FFS beneficiaries and the corresponding average total Medicare expenditures PBPM. We found that 93 percent of the participating Medicare FFS beneficiaries had one or more ACSC, as identified through a search of inpatient, hospital outpatient, and carrier claims data from their baseline year. We also found that the three most common ACSCs among these Medicare FFS beneficiaries included (1) hypertension (71 percent), (2) diabetes (52 percent), and (3) chest pain (36 percent). The three most costly categories of ACSCs (considering all expenditures for those with a given ACSC) for this group were (1) sickle cell disease ($7,242 average total Medicare expenditures PBPM); (2) bacterial pneumonia ($6,680 average total Medicare expenditures PBPM); and (3) dehydration ($5,919 average total Medicare expenditures PBPM). These high-cost subgroups have average total Medicare expenditures that are 24 to 29 times that of the average total Medicare expenditures for the group of beneficiaries without any ACSCs who enrolled in the awardee's program (who make up 7 percent of participants). However, beneficiaries with sickle cell disease make up a very small portion at 2 percent of participants, whereas beneficiaries with bacterial pneumonia and dehydration account for somewhat larger subgroups at 9 percent and 14 percent of participants, respectively. Those with no ACSCs in the baseline year had significantly lower average total expenditures ($249) relative to any individual or composite ACSC group, as shown in Table 4.

The average total cost PBPM for those flagged with an ACSC in the baseline year was almost nine times the average expenditures for those without an ACSC. Furthermore, the costs were greater for those with an ACSC in all categories of expenditures that we examined. These differences are statistically significant at the 5 percent level in all categories of expenditures and utilization that we examined except for other inpatient expenditures, hospice expenditures, and durable medical equipment expenditures. Similar to what we noted for the full set of participants, the patterns of increasing average expenditures and increasing utilization from the first three quarters to the last baseline quarter hold for those with any ACSC.

Table 4. Prevalence of ACSCs and total average Medicare expenditures in the baseline year for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

ACSC type	Count of FFS beneficiaries	Percentage (weighted) of total	Total average Medicare expenditures PBPM
Angina	179	9	$5,264
Asthma	520	25	$3,155
Chronic obstructive pulmonary disease or asthma in older adults	281	14	$4,436
Dehydration	290	14	$5,919
Diabetes	1,092	52	$2,456
Heart failure	283	14	$5,638
Hypertension	1,501	71	$2,515
Bacterial pneumonia	184	9	$6,680
Urinary tract infection	449	22	$3,061
Chest pain	756	36	$3,550
Cellulitis	214	10	$4,339
Deep vein thrombosis	65	3	$5,068
Intractable pain	314	15	$4,887
Sickle cell disease	35	2	$7,242
Syncope	200	10	$3,803
Seizure	175	9	$4,574
Any ACSC	1,980	93	$2,214
No ACSC	156	7	$249

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: Individual and composite ACSCs were identified by using the awardee's definitions applied to inpatient, hospital outpatient, and carrier claims data.

Total Medicare expenditures were calculated from all claims for each participant with at least one eligible day during the baseline year or any baseline quarter. These measures are means for the individuals in the analysis sample, not institutional means.

ACSC = ambulatory care–sensitive condition

We have also recently conducted exploratory analyses to identify the best pool of comparison beneficiaries in the New York City metropolitan area from which to draw our comparison group. In particular, we have examined the outpatient ED utilization patterns of a group of beneficiaries with ED claims from at least one of 10 potential comparison hospitals in the five hospital service areas (HSAs) that are served by the six intervention hospitals. We identified a group of beneficiaries who have primary diagnoses (that are consistent with the 16 ACSCs) during outpatient ED visits in calendar year 2015. We found reassuring evidence that we can identify a comparison group that is more than three times the size of the treatment group and in which nearly all of the 16 conditions targeted by the intervention are represented in

comparable or in greater proportions as they are in the treatment group. The one borderline case concerning sufficient representation in the comparison pool is for sickle cell disease, which is about one-quarter of that in the treatment group. However, in terms of raw numbers, the potential comparison group may still outnumber the treatment group for this relatively rare condition.

Furthermore, we have found reassuring evidence that there is little contamination between treatment and potential comparison EDs. In the large pool of potential comparison beneficiaries who visited potential comparison EDs in the same HSAs as the treatment group, less than three percent had visited a treatment ED during the same calendar year as their visit to a comparison ED.

Prior to proceeding with matching, we are investigating a puzzling situation that we have found among the Medicare treatment group beneficiaries. In particular, we have found that 16 percent of Medicare FFS participants do not have claims for an ED or observation visit near the date of their enrollment—an essential event for entrance into the program. We will consult with the awardee to understand if there are perhaps alternative types of utilization by which a participant may be enrolled.

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: New York City Health + Hospitals

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	3,051
Projected Medicaid population with 6 months of program exposure	6,907
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,021
Likelihood of all-cause hospitalizations	1,361
MDE sample size requirement to detect 20% effect	
Total expenditures	755
Likelihood of all-cause hospitalizations	341
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable. Expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core Outcomes Estimation Method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact evaluation of the awardee's program by using difference-in-differences estimation with propensity score matched comparison groups of Medicare and Medicaid adults (age 18 and older) with an ED visit to one of nine other hospitals in New York City—including the five EDs in the awardee's system that are not funded by HCIA R2. We will derive comparison groups that are similar in terms of medical, payer, and demographic information. A current challenge for the evaluation is to understand why almost 16 percent of Medicare FFS treatment beneficiaries do not have an ED visit to one of the participating hospitals within two days of enrollment; an ED visit is a requirement for participation and the primary method of recruitment. We have sufficient participation by Medicare and Medicaid beneficiaries to detect a 10 percent effect or smaller on Medicare and Medicaid expenditures.

V. NEXT STEPS

A. Implementation evaluation

As New York City Health + Hospitals enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact evaluation will include identifying Medicare beneficiaries who received care in nine comparison group EDs and who had at least one of the ACSCs or prior utilization qualifications for enrollment in the ED Care Management program. We will then attribute these potential comparison beneficiaries to the comparison group and compare baseline characteristics of the treatment and comparison groups to determine how well they match one another. We will conduct individual-level matching to balance the observable characteristics of patients in the treatment and comparison EDs. Limiting the comparison group to a matched subsample of Medicare beneficiaries—closely matching observed characteristics of the treatment group—may also reduce differences between participants and nonparticipants in terms of unobserved characteristics if those characteristics are correlated with the matching variables. If the samples are large enough and if it is methodologically feasible, we will conduct exact matching with patients from the sample of comparison hospitals. If that is not possible, we will relax the matching algorithm to allow for cases in which observable characteristics match closely but not exactly.

We are also working toward obtaining Medicaid claims data for Medicaid participants in the ED Care Management program to include in future reports. We learned last summer that the awardee had neglected to provide us with participant identifiers for nearly all Medicaid managed care participants, who account for over 80 percent of all Medicaid participants, in the finder files prior to the seventh quarterly report. The awardee has since delivered the previously missing identifiers but not in time for inclusion in our data request to New York State Medicaid for the claims data used for this second annual report.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include nurse care managers, community liaison

workers, home health intake nurses, pharmacists, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.26.

SEATTLE CHILDREN'S HOSPITAL

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MATHEMATICA Policy Research

REPORT

APPENDIX B.26

HCIA Round Two Evaluation: Seattle Children's Hospital

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Seattle Children's Hospital's Pediatric Partners in Care (PPIC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Seattle Children's Hospital's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation).

Our discussion of these topics addresses the four research questions below:

1. How much progress has Seattle Children's Hospital made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Seattle Children's Hospital addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Seattle Children's Hospital's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the PPIC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Seattle Children's Hospital, a tertiary care medical center, is using its HCIA R2 funds to implement the PPIC program for children with complex health conditions who are enrolled in both Medicaid and the Supplemental Security Income (SSI) program. The goals of the program are to (1) improve the health outcomes of children with disabilities who are covered by SSI and Medicaid; (2) reduce medical costs for these children by eliminating unnecessary, redundant, and ineffective treatments; and (3) develop a scalable, outpatient care management model that supports and optimizes the existing infrastructure for delivering care. To implement the program, the awardee is working with four Medicaid managed care organizations (MCOs) in Washington State—Molina, Community Health Plan Washington, Coordinated Care Health, and Amerigroup.

PPIC targets approximately 3,000 children and adolescents under the age of 18 in King and Snohomish counties in Washington State. PPIC staff intend to enroll approximately 1,600 of them who are identified as being at high risk for negative health outcomes. Risk is being determined on the basis of the following factors: a hospitalization within the past six months or two emergency department (ED) visits in six months and a Washington State Predictive Risk Intelligence System (PRISM) score greater than 1.[2] The program staff also plan to enroll any PPIC-eligible children who receive care from a primary care provider who is involved in the program.

The program has two components: (1) care management and coordination and (2) provider and school nurse education. Seattle Children's Hospital hired four care teams to implement these components. Each care team includes a nurse care manager and a community care coordinator. The teams enroll children and use a newly developed PPIC assessment tool to identify barriers to and gaps in the children's care. In collaboration with the children's caregivers and primary care providers, and using the PPIC assessment tool, the care team creates a care plan, and nurse care managers hold regular phone calls with caregivers and provider staff (either weekly or monthly) to review the care plan and assess each participant's status. The community care coordinator serves as a community health worker and care navigator, helping families to connect with community resources and to navigate the health care and social services systems. Care teams also counsel caregivers in how to manage a child's health conditions; support caregivers in navigating school-based resources; and connect families to community resources, appropriate therapies, or networking opportunities. As part of the provider education component, Seattle Children's Hospital also consults with and trains the children's primary care providers and school nurses in managing specific morbidities. For example, the awardee developed and presented tools that guide providers in making decisions about and managing feeding tubes.

Seattle Children's Hospital has reached agreements for a preliminary, testing stage ("shadow period") payment model with its four Medicaid MCO partners. The preliminary testing stage will include an upside shared savings arrangement with a per beneficiary per month (PBPM) care management fee.

[2] PRISM is a predictor of health care utilization developed by Washington State's Medicaid agency based on the Chronic Illness and Disability Payment System for Medicaid.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Seattle Children's Hospital during the first year of its cooperative agreement.

- Leveraging experience: Seattle Children's Hospital's experience with inpatient care coordinators and hospital clinical guidelines has helped to inform program development and implementation.
- Engaging Medicaid MCOs: Seattle Children's Hospital has agreements with four of the five Medicaid MCOs in the state to share data and to reach consensus on a payment model.

We also identified several initial challenges in implementing the program and Seattle Children Hospital's strategies for addressing them.

- Data acquisition and analysis: The awardee addressed the MCOs' concerns about data sharing and hired staff with expertise in receiving, storing, and analyzing MCO eligibility and claims data.
- Participants are spread among a large number of primary care providers: Beginning in June 2015, Seattle Children's Hospital engaged more intensively with providers who have more participants or who expressed an interest in the PPIC program.
- Early challenges with enrollment: Enrollment lagged in the first program year because of data delays and a time-intensive enrollment process. After the awardee shifted to passive enrollment and implemented a population health application, it exceeded its Year 1 enrollment target. Care teams had just begun to engage with families toward the middle of the first year.

Finally, we identified several early lessons learned by Seattle Children's Hospital in implementing its program.

- Primary care practices and school nurses were eager to partner with the awardee for training and educational opportunities.
- Working with multiple Medicaid MCOs has presented significant challenges, but by engaging with them consistently, Seattle Children's Hospital has received the claims data it needs for program monitoring and for moving forward in negotiating a shared payment model.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Seattle Children's Hospital made progress in the following areas:

- The awardee enrolled 644 direct participants and 1,259 indirect participants. Seattle Children's Hospital has also recruited 18 primary care practices, reaching 90 percent of its target of 20 practices by the end of the second year.
- The awardee completed hiring staff and continued to implement the program's care management and provider education components according to plan.

- Seattle Children's Hospital came to an agreement on a preliminary testing stage payment model with four Medicaid MCOs.

Over the past year, Seattle Children's Hospital also made the following changes to its program:

- The awardee refined the service delivery models for both program components by expanding the use of a care management tool and developing trainings for primary care practices. Program staff also created documents to track the care needs of participants and to record information on the practices, such as contact information for staff and conditions managed in the office. Seattle Children's Hospital uses this information to understand each practice's capabilities in order to better support them and keep them engaged.
- Seattle Children's Hospital has overcome challenges in obtaining utilization data from payers and delays in enrolling primary care practices, and it is now incorporating claims and utilization data into Wellcentive, its care management software system. The awardee will begin using claims data for broader reporting in late 2016.

Below we note the key challenges that Seattle Children's Hospital has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- PPIC leaders have faced challenges in developing and implementing best practices for care coordination for children in the program. Seattle Children's Hospital hopes to identify best practices that will lead to a program that is replicable and sustainable.
- Patient engagement has been a challenge, as some parents are frustrated because there are so many other people who have been calling them. In response, the care managers have been collaborating with all parties to create a mutually acceptable care plan. They may also talk to other community resources to coordinate care instead of speaking directly with the parent.
- Frontline staff reported a lack of resources for some community-based services, such as housing resources, transportation, home nurses, and applied behavioral analysis therapists for autism. In order to address these challenges, care managers have sent letters to advocate for children and have been able to move families closer to the top of waiting lists for housing.

As Seattle Children's Hospital enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Seattle Children's Hospital may have difficulty moving from the preliminary testing stage of its payment model to agreeing on a long-term payment methodology with Medicaid MCOs.
- The awardee has not completed its analysis of pharmaceutical data primarily because of the data's complexity. This has delayed planned medication interventions.
- Seattle Children's Hospital is also beginning discussions with one of the Medicaid MCOs to become a health home, which will result in a one-time enrollment payment and PBPM payments to do more intensive care management.

Table 1. Seattle Children's Hospital: PPIC characteristics at a glance

Program characteristic	Description
Purpose	Seattle Children's Hospital's (SCH) PPIC program is intended to (1) improve the health outcomes of children with disabilities who are covered by SSI and Medicaid; (2) reduce medical costs for these children by eliminating unnecessary, redundant, and ineffective treatments; and (3) develop a scalable, outpatient care management model that supports and optimizes the existing care delivery infrastructure.
Components	• Care coordination and management • Provider education and training
Target population	1,600 children and adolescents younger than 18 who: • Live in King and Snohomish counties in WA • Are enrolled in the SSI program • Are covered by Medicaid • Are identified as being at high risk for negative health outcomes
Theory of change/theory of action	SCH hypothesizes that by establishing a care team and care plans, and by providing community resources, the PPIC will: • Improve a caregiver's experience with the coordination of care • Enhance a child's quality of life • Reduce the overall health care costs for targeted children
Payment model	Value-based payments, shared savings, capitated payment for care management/coordination services
Award amount	$5,561,620
Launch date[a]	2/1/2015
Setting	Provider based
Market area	Urban, suburban
Market location	King and Snohomish counties
Core outcomes	• Improve measures of care coordination by 10% for the majority of participants • Improve measures of a child's quality of life by 10% for half of the participants • Reduce the overall cost of care by 9.7% by March 2017

[a]After the initial planning period, the awardee's program began to operate as of this date.

SSI = Supplemental Security Income

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Seattle Children's Hospital in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 27, 2016, through July 21, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- The PPIC project director
- The PPIC program coordinator
- A care coordinator
- A community health coordinator
- A community provider
- The actuary consultant
- A vice president at one of the payers.

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation: on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Seattle Children's Hospital's implementation progress during

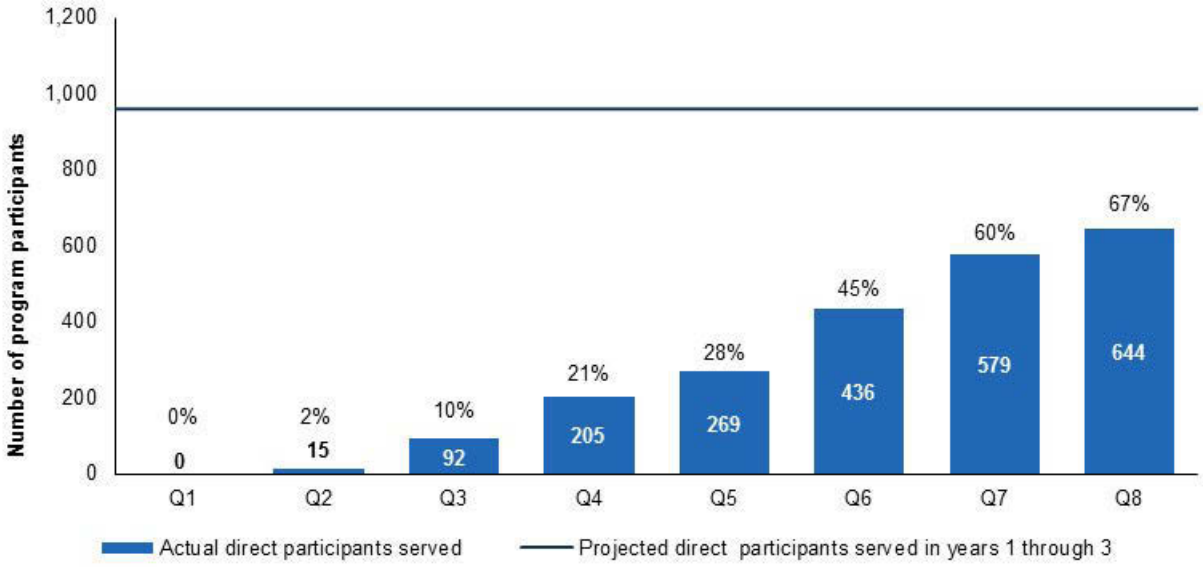
[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Overall, Seattle Children's Hospital reported to the implementation and monitoring contractor that it directly served 644 participants from February 2015 (the launch of its program) through August 2016, which represents about 67 percent of its 960 projected direct participants (Figure 1). Seattle Children's Hospital also reported that it indirectly served 1,259 participants from February 2015 through August 2016, which represents about 197 percent of its 640 projected indirect participants (Figure 2). Seattle Children's Hospital also reported that it had recruited 18 primary care practices as of May 31, 2016, which represents 90 percent of its target of 20 practices by the end of the second year.

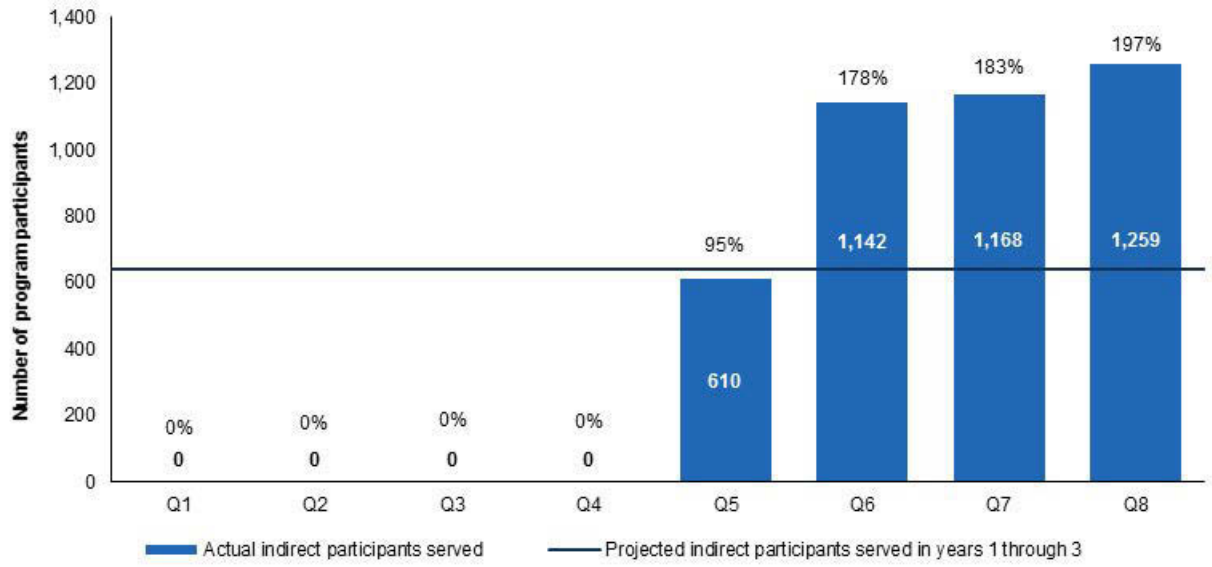
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter.

Enrolling children and families. Seattle Children's Hospital's progress towards meeting its three-year enrollment goal was influenced by three facilitators: (1) changing from an active to a passive enrollment approach, (2) identifying more eligible children than expected, and (3) the ability to avoid disenrollment by balancing the number of contacts with families.

The shift to a more passive approach to enrollment was made during the first program year. The awardee has since used claims data to identify eligible children and sends a letter to the child's caregiver welcoming the child and family into the program. Children are considered enrolled if the caregiver does not opt out regardless of whether the child has been engaged in the care planning process.

Second, staff at Seattle Children's Hospital found that they had underestimated the number of eligible children based on a PRISM score greater than 1.0, which led to a higher-than-expected number of eligible children. As mentioned above, the staff identify children who would be eligible for the program by reviewing all health records from payer eligibility and claims files. The staff also identify potentially eligible children in two other ways. They use a standard set of criteria that target children and adolescents younger than 18 in King and Snohomish counties in Washington State who are enrolled in the SSI program and covered by Medicaid. The staff also consider children who use health care services often, particularly unscheduled inpatient hospital services, ED visits, and high-cost pharmaceuticals. When program staff began to identify children who might be eligible for the PPIC, they found a number of children who were eligible

for SSI and PPIC based on all other criteria, but not enrolled in SSI. As a result, PPIC staff are now helping additional families in participating practices to enroll in SSI and in the PPIC.

Third, to facilitate ongoing enrollment and to avoid disenrollment, PPIC staff reported that they have been careful to not oversaturate the parents of participants with phone calls or other means of contact, given that parents of children with a chronic illness are typically already exhausted from negotiating ways to handle their children's health care needs.

One challenge to enrollment discussed by the interview respondents was the lack of good data on children who have disenrolled from the program. Although few of them have done so, and many of those who did have done so because their family relocated, the awardee does not have information on other reasons for disenrolling.

Enrolling primary care practices. Program staff believe that they were able to enroll enough practices for two reasons: they ensured that the PPIC met providers' needs, and they leveraged the program's association with a well-known hospital. For example, the nurse in one community health center specifically requested asthma education from PPIC staff. The center was very appreciative when PPIC staff responded to this request, and center staff later shared this information with another program.

> "Every time I go out to a practice, my question to them is, "Is this meeting your need? I know we're coming to your with a lot of papers, but is this meeting your need? What are we doing that's helping you?"
>
> — *Care manager*

One barrier to enrolling primary care practices is that providers are very busy, so they may see the program as additional work. They also do not always understand the program and its benefits. To address this challenge, the care managers sought to demonstrate the value of the program to providers by engaging with the child during an inpatient stay and then informing the primary care providers about the child's care during the hospitalization, thus making it easier for providers to pick up where the inpatient care left off. Program staff have also given presentations to providers, helping them to better understand what the program involves and how it can benefit them and their patients.

B. Implementation of the service delivery model

Seattle Children's Hospital made substantial progress in implementing its service delivery model during the second program year. The awardee refined both program components by expanding the use of its care management tool and developing trainings for primary care practices. According to its reports on self-monitoring measures, the awardee has overcome the challenge of obtaining utilization data from payers and delays in enrolling primary care practices. For example, claims and utilization data are being incorporated into the care management application Wellcentive, and the awardee is no longer reporting any challenges related to receiving data.

> "There's a time for everything. There's an absolute time for everything, and there's a time when families need us, and there's a time when they don't. When they don't, we don't want to be a thorn in their side. We just want to be there so they know they can always call us."
>
> — *Care manager*

Seattle Children's Hospital also focused on improving and refining its processes to deliver care to patients and families during the second program year. Now that program staff have engaged with

the families of more than 644 children, program leaders have identified not only opportunities for improving the PPIC program overall but also next steps for each individual case. For example, program leaders decided to vary the frequency of calls and home visits to families. For families who do not have an immediate need for care coordination, program staff have been calling them every other month instead of every month to review maintenance plans. Care coordinators also made more home visits to, for example, help a family without access to transportation to complete an application for community resources and to help a Spanish-speaking mother set up her child's glucometer.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Seattle Children's Hospital reported that identifying and developing best practices for care coordination has been a key challenge to implementing the PPIC program. In particular, there has been uncertainty about the best ways to divide up staffing and resources because of a perceived absence of identifiable best practices in the field. For example, care managers and care coordinators are assigned to participants based on the families' geographic location. PPIC leaders used this approach in order to focus the staff's attention on understanding the local community resources and to help them become more attuned to the primary care practices in the community. Seattle Children's Hospital is trying to assess whether this is the best way to organize care teams and has also considered other ways to do so, such as on the basis of specific conditions or a child's level of medical complexity. The awardee leaders and payer staff hope that the PPIC program will identify best practices for care management for children with complex medical conditions in order to replicate and expand its model.

2. Implementation processes

Leaders and staff at Seattle Children's Hospital cited three primary facilitators to the implementation process: (1) using family survey data to inform refinements to the program, (2) adopting care management software, and (3) engaging primary care providers and other community members through training events. First, the awardee has used data from its family survey administered at baseline and at 6 and 12 months to review outcomes related to care coordination, quality of life, and mental health. The awardee built its understanding of the connections between these outcomes and PPIC services in order to improve the program.

Second, Seattle Children's Hospital has used the Wellcentive care management application to facilitate program implementation because the software gives PPIC staff a single source for information on participants. Awardee leaders reported that the application has made care management processes more efficient, program activities more transparent for payer staff, and clinical and claims data easier to collate and track. Wellcentive includes a template for doing intake assessments and creating care plans, along with a standard place from which these documents can be retrieved, thereby streamlining the staff's work. The entire care team can do its work in Wellcentive, which allows each team member to be aware of what his or her colleagues are doing. This is a big improvement over prior processes, in which paper or a computer file was used, making either one accessible only to the team member who created it. Medicaid MCO staff also have access to Wellcentive, which allows them to see what services the program is providing and to collaborate with PPIC staff on care management. Awardee staff have used Wellcentive to incorporate clinical, claims, and utilization data, as well as alerts from a statewide health information exchange about hospital and ED admissions, discharges, and transfers.

Third, Seattle Children's Hospital used training events to engage providers, participants' families, and community members such as school staff. For example, awardee staff held two events about feeding tubes and feeding management, and more than 50 individuals attended each training. Program leaders believe that these trainings in particular helped to engage practices that were reluctant to participate in PPIC because they thought that the intervention was focused only on specific individuals or on care management. Seattle Children's Hospital plans to conduct a similar event in asthma training and to create educational materials on asthma for individuals with limited-English speaking abilities. The awardee is also exploring a revised primary care practice intervention focused on facilitating and supporting the implementation of a formal patient-centered medical home process among the 10 practices with the most program participants.

In terms of barriers to implementation, awardee staff cited the fact that parents did not understand the program and its benefits, or where it fits in with the other providers and resources they are already connected to. To address this issue, the care managers collaborate with all parties to develop a mutually acceptable care plan. The care managers may also speak directly with community organizations to coordinate services rather than troubling parents with another phone call. According to a primary care provider, "[Families] are definitely starting to put those pieces together and identify the program as a resource."

3. Organizational and external context

Program implementation can be influenced by individuals; by the structural, political, and cultural characteristics of the implementing organization; and by the external context in which the program operates, including local, state, and national policies, as well as the economic,

> ". . . definitely patients' parents are becoming more aware of who is calling them, and there's actually this program and this group of people working on their child's care. I think that the families are accessing it better too as they become more familiar, and develop relationships, with the care coordinators and nurses in the program."
>
> *— Community primary care provider*

political, and social environment in which the program operates.

Awardee leaders and staff identified access to internal hospital information in electronic medical records (EMRs) as the main organizational characteristic that has facilitated the implementation of the PPIC program. PPIC staff have access to information on participants who have received inpatient and outpatient specialty care at Seattle Children's Hospital. The staff can also see whether appointments have been scheduled, and they can contact families to reschedule appointments that have been missed, view specialists' notes after visits, or coordinate a care management visit along with another visit to the hospital. They can see when a participant is admitted to the hospital or ED, and they can then visit the participant's family in the hospital, follow-up by phone after the participant has been discharged, and review the discharge instructions.

The awardee identified the absence of certain community resources as a barrier in the external context. Frontline staff reported a lack of resources for some services that are necessary for participants, such as applied behavioral analysis therapists for autism, health home nurses, housing resources, and transportation. To break down this barrier, care managers have sent letters to housing agencies to advocate for children, and they have been able to move families up on waiting lists for housing. Care managers also work with families to ensure that their contact information is up to date while they are on the wait list.

C. Development of the payment model

In early 2016, Seattle Children's Hospital reached agreements with four Medicaid MCOs in Washington State for a preliminary, testing stage payment model. These four MCOs cover approximately 80 percent of the children enrolled in SSI in the two target counties. The preliminary testing stage will include an upside shared savings arrangement with a PBPM care management fee.

Interview respondents discussed two primary facilitators to negotiating and implementing the payment model: (1) building relationships with payers and (2) agreeing to a preliminary testing stage after which the model would be refined. Relationship-building has been pivotal in the awardee's success in bringing together all four MCOs. Leaders at Seattle Children's Hospital met with MCO executives even before the program was launched. The two parties continue to meet frequently and have communicated more often with the finance and actuarial leaders at the MCOs. Actuary consultants from Axene Health Partners reported that strong leadership at Seattle Children's Hospital has helped to bring the different parts of the program together and maintain momentum by showing MCOs that they can collaborate with actuary consultants. The actuary consultants also hold phone calls twice a month with leaders at Seattle Children's Hospital and with finance and actuary leaders from all four of the MCOs to discuss methodology. They focus on best practices and industry standards across all of the payers. Awardee leaders discuss issues specific to individual MCOs in separate calls.

The agreement between Seattle Children's Hospital and the MCOs for a preliminary testing stage has also facilitated the negotiation of the payment model. From April 2016 through the end of the cooperative agreement, the awardee, its actuary consultant, and the four payers will use the preliminary testing stage to refine care management interventions, process measures, and outcome metrics. The actuary consultant will facilitate quarterly meetings between awardee and

MCO leaders, and will provide total cost of care data for the PPIC program for program monitoring.

Throughout the testing stage, leaders at Seattle Children's Hospital will partner with clinical leaders at the payers to potentially modify care management interventions based on the process and outcome metrics. As noted by actuary consulting staff, this approach will allow the awardee to (1) test the PPIC program by using actual cost and utilization data to determine whether the payment methodologies "are appropriate and lead to stable metrics that a payment model could be built around" and (2) begin to see program performance and impacts. Actuary staff believe that focusing on the payment methodology framework first has allowed the MCOs to focus on areas of agreement rather than getting buried in the details of the methodology. At the end of the preliminary testing stage, the plan is for MCOs to enter into contracts with Seattle Children's Hospital.

Awardee leaders reported that competing priorities for the four MCOs working with PPIC are a minor challenge to implementing the payment model. For instance, PPIC serves a small population, so three MCOs are struggling to devote resources to the program because other, much larger initiatives are occurring simultaneously. In addition, the MCOs are engaged in other business and coordinating other projects, such as state exchange work or transitioning foster care children from a fee-for-service (FFS) system to managed care. MCO executives have made staff available for the PPIC program, and awardee leaders are working to ensure that their participation is as easy and efficient as possible.

IV. UPDATE TO EVALUABILITY ASSESSMENT

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Seattle Children's Hospital

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	8,348
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,932
Likelihood of all-cause hospitalizations	380
MDE sample size requirement to detect 20% effect	
Total expenditures	733
Likelihood of all-cause hospitalizations	95
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	Awardee is analyzing its own caregiver survey

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact analysis, though we have not yet started an analysis due to the lag in Medicaid data. The projected enrollment should provide a sufficient sample size for the impact analysis. The criteria for selection of the treatment group are well-defined and may be applied to claims data from other Medicaid beneficiaries in the state to form a potential comparison group. We will then use propensity score matching to select comparison beneficiaries who have similar characteristics and prior Medicaid service use to beneficiaries in the treatment group.

V. NEXT STEPS

A. Implementation evaluation

As Seattle Children's Hospital enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

Because all PPIC participants are enrolled in Medicaid managed care, we plan to use Alpha-MAX and T-MSIS data for our impact evaluation. We will be able to move forward with the impact evaluation after these data become available. Once we have the data, we will draw a comparison group of children from areas of Washington State besides King and Snohomish counties. The comparison group, which will resemble PPIC participants, will be composed of children enrolled in Medicaid managed care who receive SSI and have health risk profiles that are similar to the profiles of participants.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on staff members' implementation experiences and perceptions of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include nurse care managers, community care coordinators, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, nurse-practitioners, and physician assistants. The survey will focus on clinicians' implementation experiences and on their perceptions of program effects on provider behavior and patient outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on participants' experiences in the program and on their perceptions of its effects on the delivery of care and health outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in May 2017.

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APPENDIX B.27.

UNIVERSITY OF KANSAS
HOSPITAL AUTHORITY

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MATHEMATICA Policy Research

REPORT

APPENDIX B.27

HCIA Round Two Evaluation: University of Kansas Hospital Authority

August, 2017

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CONTENTS

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Kansas Heart and Stroke Collaborative, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress of the University of Kansas Hospital Authority in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of Kansas made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the University of Kansas and its implementation partners addressed the issues identified during the first program year? What factors have influenced the ability of the University of Kansas and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the University of Kansas' Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Kansas Heart and Stroke Collaborative (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the participant and clinician surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of Kansas has used funding from HCIA R2 to create the Kansas Heart and Stroke Collaborative. The Collaborative seeks to improve outcomes and reduce the cost of care for Kansans who have symptoms of, experience, or who are at risk for heart disease, stroke, or sepsis. The Collaborative works to improve care for these patients when they present in an emergency department by implementing acute care protocols that standardize care in the event of suspected heart attack, stroke, or sepsis. In addition, telemedicine helps clinicians treat these conditions by linking them to remote emergency or critical care specialists through Avera's eCare[2] eEmergency tele-health solution. The Collaborative also provides transitional care management (TCM) for patients for 30 days following discharge from the hospital and chronic care management (CCM) for (1) patients who are transitioning out of the TCM services and (2) primary care outpatients at risk for heart attack or stroke who are referred directly by their primary care providers or who have been identified by the Collaborative's population health information tools.

During the 30-day TCM period, the transitional care managers (who are advanced practice nurses) complete a home visit and make follow-up telephone calls (usually six to eight calls) with patients to monitor their health, ensure that they understand and follow their medication regimen, and help facilitate follow-up visits with the primary care physician and other specialists. CCM, which is delivered by a health coach (usually a registered nurse), includes a home visit and telephone calls to assess the physical and psychosocial well-being of enrolled participants. Since 2016, the Collaborative also has used population health tools and claims information to identify primary care outpatients not recently hospitalized or completing the TCM who would also benefit from CCM health coaching and education because of an elevated risk of heart attack or stroke.

The Collaborative has a wide range of partners that participate in various facets of the program. The University of Kansas Medical Center and the University of Kansas Schools of Medicine, Nursing, and Health Professions provide clinical support for the development of the acute care protocols and support for training. Hays Medical Center (HaysMed)—a rural tertiary care hospital in Hays, Kansas—serves as a local convening organization. Eleven critical access hospitals (CAHs) in northwest Kansas served as the original implementation sites for the acute care protocols. The Collaborative has since expanded significantly. As of August 2016, 32 sites were using the acute care protocols. Rural primary care providers and a federally qualified health center refer patients to the CCM services.

The Collaborative is working to develop an application to participate in the Medicare Shared Savings Program (MSSP) believing that such a structure and the potential for receiving shared savings will support the ongoing delivery of TCM and CCM services. The Collaborative is also testing a rural health payment model using data analytics (at the request of CMMI) to explore

[2] Avera eCare Services is a suite of distance telemedicine equipment and services affiliated with Avera Health, a large health system based in Sioux Falls, South Dakota. (See http://www.averaecare.org/ecare/.) The Collaborative is using Avera eCare's eEmergency services, in which board-certified emergency department physicians and critical care nurses deliver immediate, supportive care and nursing documentation to CAH emergency departments. (See http://www.averaecare.org/ecare/what-we-do/eemergency/.)

payment model options that could potentially support rural providers who offer a wide range of services but not inpatient beds.

The Collaborative, which launched on March 1, 2015, aims to serve a total of 10,811 participants during the three-year cooperative agreement. Additional information about the Collaborative can be found in Table 1.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the University of Kansas during the first year of its cooperative agreement.

- All 11 participating CAHs implemented heart attack and stroke care protocols, achieved Emergent Stroke Ready designation, and implemented American Heart Association–recommended practices for ST-elevation myocardial infarction (STEMI).
- The awardee began providing TCM and CCM services to patients recently hospitalized for heart attack or stroke or who were referred through primary care.
- The awardee developed self-monitoring performance feedback systems for acute care performance monitoring, which have resulted in clinical care improvements through adherence to the protocols.
- The awardee implemented the Avera eCare system (an on-demand telemedicine service), which has been well received by CAH staff and has proven beneficial to emergency care.
- The awardee entered into discussion with two other regions in Kansas about the possibility of joining the Kansas Heart and Stroke Collaborative and implementing the program in their regions.

We also identified several initial challenges in implementing the program and services, and the strategies that the University of Kansas used to address them.

- A limited pool of information technology (IT) and clinical staff in rural areas made it challenging to hire local IT staff, transitional care managers, and health coaches. The awardee worked closely with local partners to identify and recruit qualified local candidates and conducted extensive interviewing.
- The Collaborative faced a long delay in obtaining the Medicare claims data needed to develop the payment model and to risk stratify patients for CCM services. The Collaborative and its analytics contractor used historical administrative billing data from HaysMed to begin payment modeling while waiting for the Medicare claims data.
- Extracting data for performance monitoring and for transitional and chronic care management from different electronic medical records (EMRs) proved more difficult, expensive, and time-consuming than expected. More resources were devoted to the effort; manual and electronic data extraction methods are now being used; and the Collaborative's staff are working closely with participating providers to learn how to get key information from their EMRs and other IT systems.

Finally, we identified several early lessons learned by the University of Kansas in implementing its program.

- Evidence-based stroke and heart attack protocols, with individualized support to accommodate rural circumstances, may result in improved patient outcomes by shortening the critical times between arrival at the hospital, testing, diagnosis, and effective treatment.
- Rural primary care providers are receptive to transitional care and chronic care management services because they recognize that these services fill a gap and are important to successful recovery from stroke and heart attack, to managing and improving chronic conditions, and to avoiding hospital readmissions.
- Maintaining consistent communication, collaboration, and teamwork among awardee staff and partners contributes to successful operationalization and refinement of the program.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of Kansas made progress in the following areas:

- The Collaborative recruited and trained new sites to implement the acute care protocol. The awardee nearly tripled the number of sites (from 11 to 32) using the intervention and anticipated having as many as 50 sites by the end of 2016.
- The Collaborative was ahead of schedule in enrolling patients for TCM and CCM. Accelerated CCM services more than doubled the size of enrolled patients in Year 2.
- The service delivery model has been refined, including streamlining the training process for new sites and simplifying procedures for enrolling patients in CCM.
- Payment models have been refined. Recent changes to the Medicare fee schedule have increased reimbursement for care coordination, which yields better financial margins. The University of Kansas is working with several sites to pilot payment models and is working to engage commercial payers and Medicaid managed care organizations.
- U KS undertook many activities toward participation in the Medicare Shared Savings Program (MSSP) and helped to create a new legal entity for this purpose, the Kansas Clinical Improvement Collaborative (KCIC), in compliance with MSSP regulatory requirements. Participants of the Collaborative were educated about this MSSP opportunity through written materials, workshops, webinars, and one-on-one meetings. U KS developed and compiled the information necessary to complete and submit the MSSP application at the end of July.
- The Collaborative was advancing toward full implementation of its health IT infrastructure, including a private health information exchange. The exchange, along with new population health tools and telemedicine, will allow the Collaborative to create a registry of high-risk individuals, manage their care, produce metrics for each participating provider, provide e-health coaching to patients in communities without a local health coach, and remotely monitor high-risk patients.

Over the past year, the University of Kansas also made several changes to its program:

- The awardee developed and implemented acute care protocols for suspected cases of sepsis. This change was in response to sites' desire to address other time-sensitive diagnoses.
- The awardee expanded eligibility for TCM, including for patients who are discharged following a diagnosis of heart failure or chronic obstructive pulmonary disease.
- The awardee provided resiliency training and support for heart failure patients.
- The awardee received approval from the University of Kansas senior leadership team, in its role as the Collaborative's executive sponsor, for the Collaborative's long-term sustainability plan.

Below we note the key challenges that the University of Kansas has worked to address in the second year of its cooperative agreement.

- Obtaining access to Medicare claims data. The University of Kansas planned to use Medicare claims data to identify high-risk patients for CCM services, but has had difficulty obtaining the data. The awardee currently has data for 2013 and is working to secure access to 2014 and 2015 data so that it can identify high-risk patients more quickly.
- Inability to recruit health coaches in small communities.
- Physician resistance to performance improvement activities.

As the University of Kansas enters the final year of its cooperative agreement, it is aware that recent changes to the Medicare fee schedule will increase reimbursement for care coordination, which is beneficial to the awardee's payment model. However, obtaining claims data will be critical to analyzing and finalizing the payment model.

Table 1. University of Kansas: Kansas Heart and Stroke Collaborative characteristics at a glance

Program characteristic	Description
Purpose	The University of Kansas (U KS) received an HCIA R2 cooperative agreement to bring together 14 rural communities in northwest KS to improve outcomes for heart disease and stroke while reducing the cost of care.
Components	The program has three phases—(1) STEMI and stroke protocols,[b] (2) transitional care and chronic care management, and (3) population health—which are implemented through several primary and secondary components: • Care management, integrated care, medical home, transitional care coordination, telemedicine (tele-health), evidence-based clinical practice guidelines, home care, and education and training • Patient and family engagement, health IT
Target population	The Collaborative targeted residents of 14 rural northwest KS counties who were hospitalized with heart attack or stroke or who presented with symptoms of heart attack or stroke to a CAH. More recently, residents hospitalized with sepsis were added to the target population. Residents at risk for heart attack or stroke also have been included in the program, as well as patients with hypertension and hyperlipidemia. Furthermore, the program was expanded in Year 2 to cover all of KS. The target population for the acute care phase includes all payers. The other two phases target Medicare and Medicaid beneficiaries and dual eligibles.
Theory of change/theory of action	U KS hypothesizes that evidence-based protocols, provider education, telemedicine, transitional and chronic care management through health coaching, and patient and family engagement will collectively (1) produce measureable improvements in rural Kansans' heart health and post-stroke survival (and sepsis more recently) and (2) drive significant reductions in total cost of care related to heart disease and stroke.
Payment model	New fee-for-service (FFS) payment, shared savings under MSSP
Award amount	$12,523,441
Launch date[a]	March 1, 2015
Setting	CAHs, primary care providers, community health care clinics, tertiary care hospital, academic medical center, patients' homes
Market area	Rural
Market location	KS
Outcomes	• Rate of heart attack and stroke in target population (20% reduction estimated) • Thirty-day acute myocardial infarction (heart attack) mortality rate • Specific, recognized heart attack and stroke clinical metrics (for example, time to tests, administration of therapy) • Hospital all-cause unplanned readmission • Medication adherence • Target population discharged alive for heart attack, coronary artery bypass graft, or percutaneous coronary intervention from January 1 to November 1 of year prior to measurement year • Rates of emergency department visits • Rates of transfers to other settings • Inpatient days after readmission

[a]After the initial planning period, the awardee's program began to operate as of this date.

[b]The Collaborative recently added sepsis to the conditions that it addresses. This addition was in response to requests from sites to address other time-sensitive diagnoses, but was not part of the Collaborative's original plan.

CAH = critical access hospital; IT = information technology; MSSP = Medicare Shared Savings Program; STEMI = ST-elevation myocardial infarction

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of Kansas in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 18 through July 29, 2016. For the analyses of the awardee's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct 10 telephone interviews with the following program staff:

- Program leaders, including the executive director and operations director
- Training managers
- Frontline staff, including a health coach and transitional care manager
- Physician and nurse champions
- Chief operating officer of a participating site
- Analytics lead

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

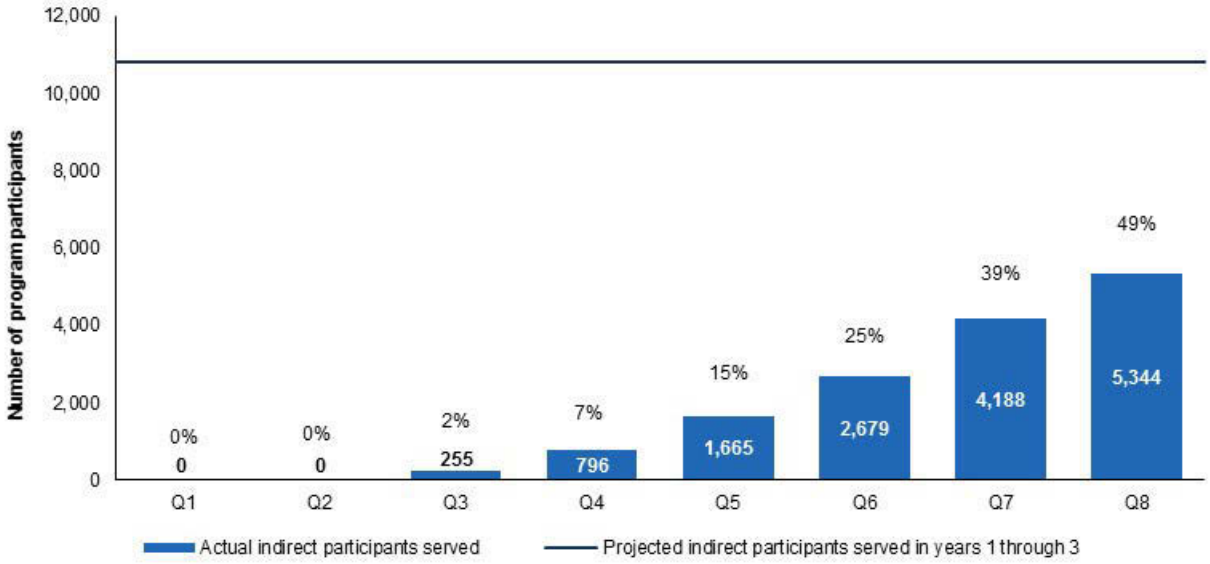
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the University of Kansas's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the University of Kansas reported to the implementation and monitoring contractor that it indirectly served 5,344 participants from March 2015 (the launch of its program) through August 2016, which represents about 49 percent of its three-year goal of 10,881 projected indirect participants (Figure 1). The steady growth in participation is due to expansion of the program across Kansas and initiation of CCM services to the ambulatory care population. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. U KS does not have direct participants.

The Collaborative's progress in meeting its three-year enrollment goal was influenced by several factors. It was able to quickly develop and refine the health coach and transitional care manager roles, which in turn led to more effective recruitment and staff retention. The Collaborative expanded the scope of its clinical interventions as well as site and physician participation across the state. Although it was hindered in identifying patients for CCM services due to lack of claims data, new population health IT tools have greatly improved the Collaborative's ability to identify and create a registry of high-risk individuals.

B. Implementation of the service delivery model

Overall, the awardee has been highly successful in implementing its service delivery model and replicating it around the state. The Collaborative began with 11 sites implementing the acute care protocols and expected to more than triple the number of sites by the end of 2016. The Collaborative continues to hire additional health coaches and transitional care managers as the number of participating communities increases. It recently hired a second training manager. The Collaborative expanded the number of conditions that qualify patients for TCM services and it is developing acute care protocols for sepsis, which is a time-sensitive diagnosis like heart attack and stroke. The awardee is pursuing the formation of a patient safety organization[4] that will enable it to conduct additional quality improvement work in rural health settings. The awardee continues to develop its payment model, which will support the delivery of TCM and CCM services, and to look for new ways to sustainably fund rural health care and drive quality improvement.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Overall, the design of the program and the limited changes that have been made to it have allowed the University of Kansas to quickly scale up its implementation effort. Although the Collaborative has expanded the number of conditions it addresses, the processes for training new sites, enrolling patients, and providing TCM and CCM services have remained the same. This consistency supports effective replication in new sites and communities.

[4] Patient safety organizations (PSOs), as defined under the Patient Safety Quality Act of 2005, are entities that do not have public or private regulatory responsibilities; are able to collect and analyze data; have mechanisms for communicating with health care facilities, providers, and plans; are linked with initiatives for conducting research and demonstrations to improve health care quality; and, most importantly, have legal protections for the identities of the providers involved in a patient safety event or its reporting. Entities wishing to become a PSO must apply through the Agency for Healthcare Research and Quality for certification. (See https://www.pso.ahrq.gov.)

In addition, the knowledge and expertise of program leaders have contributed to a robust understanding of community needs and strategies for working with rural health providers to enhance, rather than replace, local services. The executive director, operations director, and training manager have all worked in rural health for over 20 years, while the executive director also practiced family medicine in rural northwest Kansas. The program leaders' deep familiarity with rural health in Kansas has enabled them to develop materials and resources that meet the needs of CAHs and rural health care providers. The program leaders have also been deliberate in their approach to staffing the program and in selecting IT products. They have preferred to wait to hire a superior candidate or acquire an IT product that truly meets their requirements, rather than select what is available. Similarly, when they have identified cost savings, they have elected to use those dollars to fund direct services rather than add administrative staff.

> "Up-front money from the award allowed the creation of a purposeful infrastructure and gives legitimacy to the endeavor. That really needs to be conditioned on getting the right players together. You also need the buy-in and collaboration. Money alone is not sufficient."
>
> *— Program leader*

Some providers do not readily see the potential benefits of the program and are reluctant to participate. The program leaders have addressed this by engaging in ongoing outreach and discussion with both sites and providers. In addition, because the program's approach was entirely new, the transitional care managers and health coaches needed to develop their own roles. As one transitional care manager noted, "This is a whole new position and there's nothing that's been done like this, so there's not really anybody to learn from."

> "Their providers are excited for us to see their patients, especially in these smaller clinics that are so busy, and they don't always have time to get their patients into the clinic in a timely manner. They're excited for us to be able to help."
>
> *— Transitional care manager*

One facilitator of the acute care protocol component success was that the Collaborative started collecting data and reporting scores on performance measures for participating hospitals. These data show how each hospital's performance stands in relationship to the others. As one of the Collaborative program managers noted, "No one likes to be last." One hospital greatly improved performance after its quality director saw the reports and realized how badly the hospital needed to catch up to its peers. The program manager we spoke to noted that she reports her insights from the hospital performance data to the Collaborative's program leaders; the Collaborative's executive director may then meet with hospital staff to discuss their performance and how to improve.

2. Implementation processes

The respondents we spoke to often attributed the Collaborative's successes to the strength and commitment of its staff. Program leaders have worked extensively with sites to help them understand the Collaborative's goals and how they can better participate. The executive director alone traveled over 80,000 miles across the state to meet with site leadership, physicians, and others to

> "We know the people that are leading the project professionally. They share the sentiments, the concerns of rural communities, and the importance of keeping people in those areas. . . . They're moving in the right direction, and it was definitely a train I wanted to hop on."
>
> *— Nurse champion*

promote the Collaborative's work and secure participation. The willingness of program leaders to work with sites can be seen in the rapid expansion of the Collaborative and the positive word of mouth among the state's providers and administrators.

The Collaborative has also engaged providers across the care continuum. As part of the acute care protocols, sites worked with their local emergency medical services to improve treatment for heart attack and stroke before patients even arrived at the hospital. In addition, the sites are interested in working with long-term care facilities to offer care management services that could help reduce hospital readmissions.

The program staff have continued to refine the program. As a result of participant feedback that the heart and stroke trainings take too much time away from patient care, program staff condensed the trainings so that they now only take one day. The transitional care manager and health coaches have also identified best practices in working with patients and providers. For example, the transitional care managers noted that patients were more likely to enroll in the services if they received a courtesy visit while they were still hospitalized. As a result, the transitional care managers prioritize making these visits so that the patient knows who they are when they call to set up a home visit. The transitional care managers and health coaches also collaborated with the training manager to improve the enrollment process. Transitional care managers now obtain consent for health coaching when they complete the home visit so that health coaches do not need to obtain a separate consent later, which prevents a lapse in services. The health coaches also noted that having a primary point of contact at each clinic improves efficiency.

Although interviewees felt that the Collaborative had made great strides, there were challenges related to the level of effort required of participating sites, challenges inherent to rural health care delivery, and a need to create new programs, services, and roles. There is a substantial amount of effort required by sites to participate. Although the Collaborative has tried to make the process as easy as possible, it is still time-consuming to perform the baseline data collection (both for Collaborative and site staff) and to prepare quarterly reports on outcomes. In addition, there is frequent turnover among hospital staff, which means that ongoing or repeated training is needed to reinforce the use of the protocols.

> "The new participating hospitals would love to fill a health coach position for chronic care management, but when they can't even cover their own hospital without agency nurses, they're not willing to [lose another good nurse] to do that."
>
> — *Training manager*

The Collaborative has experienced challenges related to staffing in the participating hospitals. In general, rural communities have a difficult time hiring and retaining clinical staff. As a result, some sites have been reluctant to advertise for the health coach position because they don't want to lose a hospital nurse to the role. Some sites have struggled to find a health coach who can be a self-starter and who is comfortable with home visits. The health coaches and transitional care managers have had to learn to work with a wide range of local primary care physicians and other providers to adapt to their preferences. There has also been variation in physicians' willingness to engage and refer patients. Although some are quick to see the benefits for their patients, others have been more reluctant to engage with the program.

Each site is encouraged to have a local physician champion who (1) provides clinical support to the health coach; (2) engages with and shares information with local physicians, colleagues, other providers, and participating sites; and (3) serves on one or more of the Collaborative's governance committees. The champions are paid a small stipend for their efforts. The Collaborative is exploring additional ways to enhance the work of the local champions, such as newsletters and emails, to help engage and communicate with physicians, other providers, and the participating hospital within their communities.

> "[Rural communities] need access to clinical care locally and some urgent or emergent care. Otherwise, we're going to start looking at rather large distances of moving folks around. And that's not going to be any cheaper and the outcomes are going to be worse."
>
> *— Executive director*

3. Organizational and external context

According to respondents, the Collaborative's strong awareness of its skills and limitations and understanding of the environment in which it operates contribute to its success. As noted previously, the program leaders are very connected with rural health in Kansas and are committed to the proposition that "where you live shouldn't determine if you live."

> "We do not want to compete, we just want to fill in gaps. We don't want to get in the way of local practices thriving and being successful."
>
> *— Operations director*

Rural communities and health care providers across the state face resource limitations. For example, there are often few health care professionals available to hire. Some hospitals are reluctant to advertise for a health coach because they run the risk of losing a hospital nurse to the role. There is also distrust among small rural and frontier communities of the University of Kansas and larger communities such as Hays. The Collaborative is very careful to emphasize that its aim is to support local practices, not displace them.

The existing rural health networks within the state have provided a scaffold for the Collaborative's work. The rural health networks were originally developed to meet regulatory requirements for CAHs, but have proven to be a useful mechanism for introducing new sites to the acute care protocols and transitioning rural health providers from fee-for-service reimbursement to more population health–based approaches.

Some providers are also reluctant to accept what they see as "cookbook medicine" (for the acute care protocols) or an intrusion into their care relationship with patients (in the case of the TCM and CCM services). In addition, many primary care physicians are simply not accustomed to taking a population health perspective of their patients. It requires a shift in mindset for the primary care physician to take both an individual-level and a population-level view. However, the shift to a population-based mindset is important because rural providers are increasingly being asked to focus on and improve quality and outcomes at the population level.

In addition, rural providers are sometimes wary of "big city" solutions to rural problems. However, the University of Kansas trained approximately 60 percent of the physicians practicing in the state. The university also has significant resources, including heart attack and stroke training coordinators, a nationally known expert in sepsis, and other resources that can support the Collaborative's clinical and administrative activities. Furthermore, the University of Kansas

has committed to supporting the Collaborative through at least 2020—three years after the conclusion of the cooperative agreement. To bring the university's resources to bear in rural communities, the Collaborative is careful to engage with the rural providers to understand their needs and tailor resources appropriately.

Finally, the Collaborative currently has a limited ability to address liability concerns for sites that, for performance improvement, want to conduct deeper investigations of patient safety and quality issues that may arise from this project. The Collaborative is planning to form a patient safety organization so that the sites have a venue for conducting more in-depth examination of safety issues under the protections of privilege and confidentiality.

C. Development of the payment model

The awardee has implemented a payment model that uses existing cost-based payment structures, the Medicare fee schedules, to fund the transitional and chronic care management services. The awardee has also determined that the patient volume is sufficient for the services to break even financially. The proposed 2017 Medicare fee schedule relaxes rules around billing for care coordination services, which will provide even more revenue. The awardee had originally planned to develop a payment model that would have provided alternatives to cost-based reimbursement for rural providers. This would have preserved local access to care by providing CAHs and rural health clinics with a more stable funding base. This proved to be infeasible because of the need to waive certain Medicare rules and the limited timeline under the cooperative agreement to do so. As a result, the awardee analyzed the viability of participation in the MSSP. The application was structured so that the Collaborative would work with Blue Cross Blue Shield of Kansas, the state's dominant commercial payer, to pay for care management services for specific covered lives. The proposed MSSP model was approved by the University of Kansas senior leadership team and is included in the program's sustainability plan. The awardee then developed its application for the MSSP as an alternative source of revenue via shared savings payments and sustainability to support TCM and CCM services. The Collaborative recently spearheaded the formation of the Kansas Clinical Improvement Collaborative, a sister accountable care organization that will manage the MSSP work.

In addition, CMMI asked the Collaborative to test its rural health care models by using data analytics. Working with its data analytics vendor, PYA Analytics, the Collaborative has initiated the process of defining specific requirements for both payment models, based on (1) 2009–2013 Kansas-specific Medicare claims data secured from ResDAC and (2) 2014 commercially available de-identified Medicare claims data.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents a summary of the baseline characteristics of the treatment group, measured during the 12 months before the enrollment date for each beneficiary, which is the date of receiving acute care services for stroke or heart attack at a facility associated with the awardee. More precisely, for the purpose of our evaluation, the treatment group consists of individuals who present at rural hospital emergency departments (EDs)—in both the critical access hospitals (CAHs) and the supporting tertiary hospital for the respective health network, HaysMed—with symptoms of a stroke or heart attack.

A. Baseline characteristics of the treatment group

The original facilities participating in the University of Kansas program started applying acute care protocols for stroke and for heart attack in March 2015. By the end of May 2016, there were 1,334 Medicare enrollees who had received those acute care protocols and had enough information provided by the awardee to be successfully matched to Medicare claims. Ninety beneficiaries were excluded from the analysis because they were not enrolled in Medicare fee-for-service (FFS).

In presenting baseline characteristics for this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, Parts A and B, with Medicare as the primary payer at the time of their University of Kansas enrollment date, who had met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment) and who could be identified in the Virtual Resource Data Center's Medicare health insurance claim-to-beneficiary ID crosswalk. The calendar period covered by the baseline quarters is determined by the enrollment date for each participant and therefore varies by participant. After we excluded beneficiaries who did not meet the above criteria, a total of 1,244 participants were included in the analysis of baseline characteristics for this report.[5]

The results of our analysis on baseline demographic characteristics (Table 2) indicate that the Medicare FFS population enrolled in the University of Kansas program is predominately white and older (that is, 65 and older). There is one beneficiary enrolled in hospice and very few beneficiaries (n = 4) with end-stage renal disease (ESRD). As expected, the hierarchical condition categories (HCC) scores of program participants are higher than the national average, with a mean of 1.74 and a median of 1.32.

[5] Because of an adjustment in the awardee's reporting schedule, its finder file was not received in time for this report. The figures in this section reflect beneficiaries who enrolled before November 30, 2015. Results differ somewhat from those in our previous report because of the correction of errors related to duplicated data.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 1,244)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	142	11
65 to 74	419	34
75 to 84	432	35
85 and older	251	20
Gender		
Female	571	46
Male	673	54
Race		
White	1,229	99
Black	5	0.4
American Indian, Alaska Native, Asian/Pacific Island American, or other	2	0.16
Hispanic	5	0.4
Original reason for Medicare eligibility		
Old age and survivor's insurance	980	79
Disability insurance benefits	260	21
ESRD[a]	4	0.32
Hospice[b]	1	0.08
Medicare/Medicaid dual status, percent dual[b]	195	16
HCC score[c]		Statistic
Mean		1.74
25th percentile		0.79
Median		1.32
75th percentile		2.26

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which a beneficiary was admitted to a participating hospital and was diagnosed as having a heart attack or stroke. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Table 3 shows baseline expenditure and utilization data for a common set of measures for the four quarters prior to enrollment. The higher-than-average HCC scores are consistent with the high total Medicare expenditures per beneficiary per month (PBPM) shown in the table. On average, the PBPM expenditures during the 12 months before enrollment were $1,382—substantially higher than the national average Medicare expenditure of about $790 per month. Multiple spending categories drove high costs, including inpatient ($433 PBPM), outpatient ($434 PBPM), physician services ($227 PBPM), and skilled nursing facility ($171 PBPM).

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	1,244	1,219	1,229	1,244	1,244
Average Medicare expenditures PBPM[a]					
Total	1,382 (59)	1,109 (72)	1,241 (85)	1,393 (94)	1,775 (108)
Acute inpatient	433 (27)	342 (41)	366 (44)	441 (49)	581 (58)
Inpatient other[b]	24 (7)	17 (10)	38 (16)	16 (10)	24 (11)
Outpatient[c]	434 (19)	398 (31)	424 (24)	406 (21)	509 (24)
Physician services	227 (9)	191 (11)	203 (12)	232 (14)	279 (16)
Home health	40 (5)	29 (5)	45 (7)	40 (6)	46 (6)
Skilled nursing facility	171 (20)	85 (20)	115 (24)	204 (41)	275 (47)
Hospice	1 (1)	0 (0)	0 (0)	0 (0)	3 (3)
Durable medical equipment	53 (4)	47 (4)	50 (4)	55 (5)	59 (5)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	585 (30)	445 (42)	536 (51)	562 (49)	791 (61)
Outpatient ED visits	1,068 (111)	962 (118)	1,073 (150)	995 (123)	1,235 (119)
Observation stays	187 (15)	122 (20)	164 (24)	204 (29)	257 (31)
Primary care visits in any setting	5,119 (208)	4,466 (233)	5,021 (256)	4,929 (267)	6,004 (287)

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Primary care visits in ambulatory settings	3,458 (152)	3,124 (164)	3,418 (172)	3,335 (166)	3,907 (184)
Specialist visits in any setting	7,546 (266)	6,822 (292)	7,347 (352)	7,366 (324)	8,612 (352)
Specialist visits in ambulatory settings	6,080 (201)	5,777 (229)	6,025 (261)	5,902 (246)	6,589 (247)
Measures of any health care utilization					
Percentage with a hospital admission[d]	34 (1)	10 (1)	10 (1)	12 (1)	15 (1)
Percentage with an outpatient ED visit[e]	45 (1)	15 (1)	16 (1)	15 (1)	20 (1)
Percentage with an observation stay[f]	15 (1)	3 (< 0.5)	4 (1)	5 (1)	6 (1)
Percentage with a 30-day readmission among all discharges	15 (1)	9 (3)	10 (2)	16 (3)	21 (3)
Percentage of participants with a readmission among all participants	5 (1)	1 (< 0.5)	1 (< 0.5)	1 (< 0.5)	2 (< 0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

Fourth quarter expenditures, spanning the three months before enrollment, were notably higher than for earlier quarters ($1,775 PBPM in quarter 4). In this quarter closest to enrollment, average expenditures were highest across most expenditure categories—notably so in acute inpatient ($581 PBPM and 34 percent higher than the 12-month average), outpatient ($509 PBPM and 17 percent higher than the 12-month average), physician services ($279 PBPM and 23 percent higher than the 12-month average) and skilled nursing facility ($275 PBPM and 61 percent higher than the 12-month average).

Increases in measures of utilization accompanied the rise in fourth quarter expenditures. The average rates per 1,000 beneficiaries over all 12 baseline months included 585 acute hospital admissions; 1,068 outpatient ED visits; 187 observation stays; 5,119 primary care visits; and 7,546 specialist visits. The rates of utilization were highest for the enrolled population in the fourth quarter, closest to enrollment, over all utilization types. Of particular note, rates of acute hospitalization, outpatient ED visits, and observation stays in the fourth quarter were 35 percent, 16 percent, and 37 percent higher, respectively, than the 12-month averages. The increases in these utilization measures suggest that the enrolled heart attack and stroke patients were incurring hospital-related charges just prior to the enrollment event.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: University of Kansas

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	1,833
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,649
Likelihood of all-cause hospitalizations	1,423
MDE sample size requirement to detect 20% effect	
Total expenditures	412
Likelihood of all-cause hospitalizations	356
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We plan to conduct a rigorous impact analysis of the University of Kansas intervention for heart attack and stroke. Because the initial intervention has been extended to other rural areas in the state, we are currently assessing CAHs in rural counties in Nebraska as a source of comparison beneficiaries. We expect the two groups to be broadly well matched at the outset but we will compare demographic characteristics and prior use of beneficiaries presenting in Kansas and Nebraska to ensure comparability.

V. NEXT STEPS

A. Implementation evaluation

As the University of Kansas enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will continue to assess the validity of a comparison group drawn from individuals who present with a heart attack or stroke at nonparticipating rural hospitals that are associated with networks serving counties with similar population characteristics as the counties served by the awardee. For this purpose we will explore the CAHs and supporting hospitals in two separate networks in Nebraska: (1) Regional West Medical Center–South and (2) Good Samaritan Network.

The next step in the impact analysis is to identify and pull claims data for all Medicare beneficiaries who suffered a heart attack or stroke and received treatment at a CAH in either the treatment or comparison group. After identifying the treatment and comparison beneficiary populations, we will compare our list of treatment beneficiaries to a finder file, provided by the awardee, which lists beneficiaries treated by the participating CAHs. By comparing beneficiaries identified by the evaluation team to the list of beneficiaries provided by the awardee, we will validate our methodology for identifying heart attack and stroke patients at comparison CAHs and make adjustments, if necessary.

After attributing beneficiaries to the treatment and comparison groups, we will create the variables necessary for the analysis, including outcome and explanatory variables, and compare demographic and baseline characteristics across those two groups to ensure sufficient comparability between the two populations. If there are many significant differences, we will conduct a propensity score analysis to match comparison beneficiaries and better align characteristics across the treatment and comparison groups. We will describe our findings in future reports. Finally, we will produce initial impact estimates for the first one to two quarters of program operations, depending upon data availability.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of rural hospital clinician staff who are participating in the Kansas Heart and Stroke Collaborative.** Eligible clinicians include rural hospital physicians, nurse practitioners, and physician assistants who are participating in the Collaborative and have been trained in the heart and stroke protocols and who provide care to emergent patients. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.
- **A survey of participants who received services directly from University of Kansas' program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.28.

UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

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REPORT

APPENDIX B.28

HCIA Round Two Evaluation: University of North Carolina at Chapel Hill

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Better Back Care (BBC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the University of North Carolina at Chapel Hill's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of North Carolina made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the University of North Carolina and its sites addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the University of North Carolina's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the BBC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the clinician survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of North Carolina received HCIA R2 funding to implement the BBC program (key program characteristics are noted in Table 1). The program's target population includes Medicare and Medicaid enrollees who visit a participating outpatient primary care or specialty provider across a seven-county region in North Carolina for acute, nonspecific lower back pain (LBP) and who have not seen a provider for back pain in the previous six months. The BBC program's goals for patients with acute LBP are to (1) reduce the use of imaging and injections, thereby reducing Medicare spending; (2) achieve clinically significant improvement in functional and general health outcomes; and (3) improve patient satisfaction with physician and office staff. The BBC program seeks to meet these goals through (1) the adoption of evidence-based treatment guidelines and shared decision making for patients with LBP, (2) increased access to primary care and appropriate specialty care, and (3) coordination of care across primary and specialty care providers for patients with acute LBP. The program was launched on February 23, 2015, with the enrollment of the first participant. Participating practices have been primarily recruited from four medical groups:

1. University of North Carolina Faculty Physicians includes the medical system's spine center; neurology, neurosurgery, geriatrics, and emergency departments; orthopedic services; and primary care providers (all of whom are affiliated with the University of North Carolina School of Medicine).
2. University of North Carolina Physicians Network is an association of more than 40 independent practices spread across 12 North Carolina counties that receives operational support from the University of North Carolina.
3. Piedmont Health Services comprises 12 community and rural health centers with employed providers, some of which are training sites for the University of North Carolina School of Medicine.
4. Advance Community Practice is a group of 11 providers practicing at multiple sites across North Carolina, including a large practice in southeast Raleigh, which is part of the BBC program's expanded service area.

The BBC program relies on an LBP checklist and decision-support tool that is embedded in the electronic medical record (EMR), or paper versions when EMR versions of the checklist are unavailable. Providers are asked to use the checklist with patients who present with acute LBP. The checklist serves as a decision-support tool that encourages provider adherence to evidence-based acute LBP guidelines and is one method used to help determine if a patient is a potential program participant. The BBC program is designed to guide providers toward using the most conservative—but appropriate—treatment approach. The program emphasizes conservative treatments, such as home exercises, physical therapy, and consultation with a pain psychologist or an exercise physiologist, over invasive, costly, and non-evidence-based imaging, injections, and surgeries. Patient handouts describing best practices in LBP self-treatment are automatically generated for the providers using an EMR-embedded checklist; handouts are also available for providers who use a paper version of the checklist.

The BBC program's current enrollment goal is to serve 2,046 direct participants by the end of the three-year cooperative agreement. To identify eligible individuals, BBC care managers pull a daily list of diagnosis codes for Medicare or Medicaid enrollees who have visited participating practices and might have acute LBP. The care managers review the medical records, including any completed or partially completed LBP checklists, to select patients who are likely eligible for the program. The care managers then contact patients by phone within 48 hours of the first provider appointment to collect additional information about the patient's medical history and confirm eligibility. If the care managers do not discover any disqualifiable information (such as previous LBP-related visits to other providers in the past six months or previous surgery involving spinal hardware), the individual is enrolled in the BBC program.

After enrolling patients, care managers use a decision-support tool to guide treatment discussions and determine next steps, which may include exercises to mitigate back pain, use of medication recommended by a provider, or referrals to other providers. Care managers contact participants again two weeks after their initial office visit for LBP to follow up and provide additional support as needed. For interested participants, care managers continue to check in, help coordinate care, and encourage positive health behaviors such as exercise. This care coordination and support can continue for as long as care managers deem necessary to treat an episode of acute LBP, though usually no longer than three months.

The University of North Carolina is in the process of developing a care management fee with a performance component and a bundled payment, but is also exploring ways to integrate the BBC program into an alternative payment model. The awardee payment model team is working with the largest local payer as well as other local stakeholders on payment model development.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes that the University of North Carolina achieved during the first year of its cooperative agreement.

- The University of North Carolina completed staffing the BBC program, including hiring three full-time care managers, a quality improvement coordinator, a project manager, a part-time pain psychologist, and a part-time exercise physiologist.
- The awardee created a customized checklist for acute LBP for inclusion in the primary EMR system that makes patient education handouts automatically available for patients when participating providers complete the checklist.
- The awardee enrolled 23 practices, provided training for their staffs, incorporated the checklist into their EMR systems, educated them on new referral options available as part of the BBC program, and continued to offer ongoing support.
- The awardee created a customized care management database that allowed for consistent data collection and that provides decision support for the care managers.

We also identified several initial challenges in implementing the program and the University of North Carolina's strategies for addressing them.

- Patient enrollment numbers were significantly lower than initially projected. Data on the percentage of Medicare and Medicaid enrollees with acute LBP was unavailable before the start of the BBC program and significantly fewer patients with acute LBP presented than were expected.
- Provider engagement was not as strong as anticipated. To increase engagement, BBC staff visited practices to discuss the program and posted BBC flyers in exam rooms to remind providers about the program.
- Some providers were "intimidated" by the length of the checklist. To address this issue, the awardee educated providers on the most important questions to complete and shortened the checklist.
- The awardee was unable to get Medicaid data through a third party as planned, so program staff applied directly to the North Carolina Division of Medical Assistance for a limited data set of Medicaid enrollees.

Finally, we identified some early lessons that the University of North Carolina learned in implementing its program.

- Addressing low participant enrollment requires multiple strategies. These strategies have included recruiting additional practices, expanding the program service area, and identifying potential participants by using diagnosis codes after new patient visits rather than requiring a completed checklist from a provider.
- Having the checklist available in practices' EMRs before training providers on how to implement the BBC program is important for maintaining initial momentum and encouraging providers to immediately begin using the checklist following its introduction.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of North Carolina made progress in the following areas:

- The University of North Carolina recalibrated the BBC program's direct enrollment target from 10,662 participants to 2,046 participants and added an indirect enrollment target of 800 participants.
- To increase enrollment in the program, the awardee added 12 practices, shifted its enrollee identification strategy from relying on physician referrals to reviewing daily diagnosis code reports, and added staff hours for identifying potential participants.
- The awardee continued to encourage provider engagement with the program. For example, the BBC program disseminated "Provider Profile" reports and continued outreach and education efforts to nurses and medical assistants so that they could assist providers in completing the LBP checklist.

Over the past year, the University of North Carolina did not make any significant changes to the BBC program model. Below we note the key challenges that the awardee addressed in the second year of its cooperative agreement.

- Many of the practices added in the second year use EMR systems that operate on a different platform than those of practices already participating in the BBC program. Adapting the EMR systems to support BBC processes—including integrating the LBP checklist and automating the daily generation of diagnosis code reports—resulted in implementation delays.
- Provider engagement and use of the checklist continue to be sporadic and generally lower than desired. Barriers to engagement included lack of an electronic checklist (for some practices), demands from an evolving health care system, the fee-for-service (FFS) payment environment, and practices' organizational cultures. BBC program staff relied on education and the Provider Profile utilization reports as the primary means of countering these challenges.
- Some participants (including those enrolled in Medicaid, in particular) have high needs, with many medical and nonmedical concerns that have hindered the BBC staff's ability to assist them with program services. Program staff have not yet identified strategies to address many of these barriers.

As the University of North Carolina enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The total number of participants and their associated claims are smaller than originally envisioned, which may limit the awardee's ability to detect statistically significant LBP prevalence and cost estimates and to calculate overall medical expense savings from the BBC program. The awardee also continues to face delays in receiving Medicaid data files from the Division of Medical Assistance. Furthermore, the University of North Carolina does not expect the data to allow for the identification of BBC participants.
- In addition to exploring a potential bundled payment and a care management fee plus performance payment for BBC services, the awardee is considering methods of incorporating BBC activities into larger, alternative value-based payment systems.
- A private insurer expressed an interest in conducting an analysis of its own claims data to better understand resource use for acute LBP. This type of analysis would advance the awardee's understanding of the optimal services to include in a potential payment bundle related to caring for acute LBP.

Table 1. University of North Carolina: BBC program characteristics at a glance

Program characteristic	Description
Purpose	The University of North Carolina (U NC) intends to encourage conservative, evidence-based treatment of acute LBP with its BBC program. An LBP checklist, which is integrated into the EMR or provided on paper, (1) prompts participating providers to follow an evidence-based treatment protocol for all patients presenting with new, acute LBP and (2) offers decision support.
Components	• Care management • Evidence-based treatment for acute LBP • Health information technology • Shared decision making
Target population	Participants seen at BBC practices for the first time or within their first episode of care who meet the following criteria: • Seeking care for a new episode of LBP with a pain duration of less than 3 months and no clinical red flags • Have not seen a provider for back pain in the previous six months • Are 18 years or older • Are Medicare beneficiaries (FFS or Medicare Advantage) or Medicaid recipients • Speak English or Spanish
Theory of change/theory of action	The BBC program is intended to decrease costs and improve quality of care for patients with acute LBP through the following: • Encouraging primary care providers to use a checklist that guides evidence-based assessment and treatment of LBP during the first office visit • Employing care managers, who facilitate appropriate access to care, shared decision making, and coordination of care across primary and specialty care providers to guide participants to the lowest appropriate level of care or refer them to specialists known to provide conservative treatment • Ensuring a referral network of specialists who provide conservative, evidence-based care, as well as other professionals—such as an exercise physiologist and pain psychologist—who can provide the appropriate level of care
Payment model	New FFS payment, value-based payment, bundled or episode payment
Award amount	$6,034,888
Launch date[a]	February 23, 2015
Setting	Participating practices and in the community
Market area	Rural, urban, and suburban
Market location	Seven-county region in central NC
Core outcomes	• Increase in patient satisfaction • Decrease in care that does not conform to evidence-based guidelines (excess spinal imaging and injections)

[a]After a planning period, the awardee's program became operational as of this date.

EMR = electronic medical record; FFS = fee-for-service; LBP = lower back pain

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of North Carolina in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 7 through June 14, 2016. For the analyses of the University of North Carolina's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Four program leaders and co-investigators at the University of North Carolina
- Two BBC care managers
- The BBC exercise physiologist
- Two members of the University of North Carolina payment model development team

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

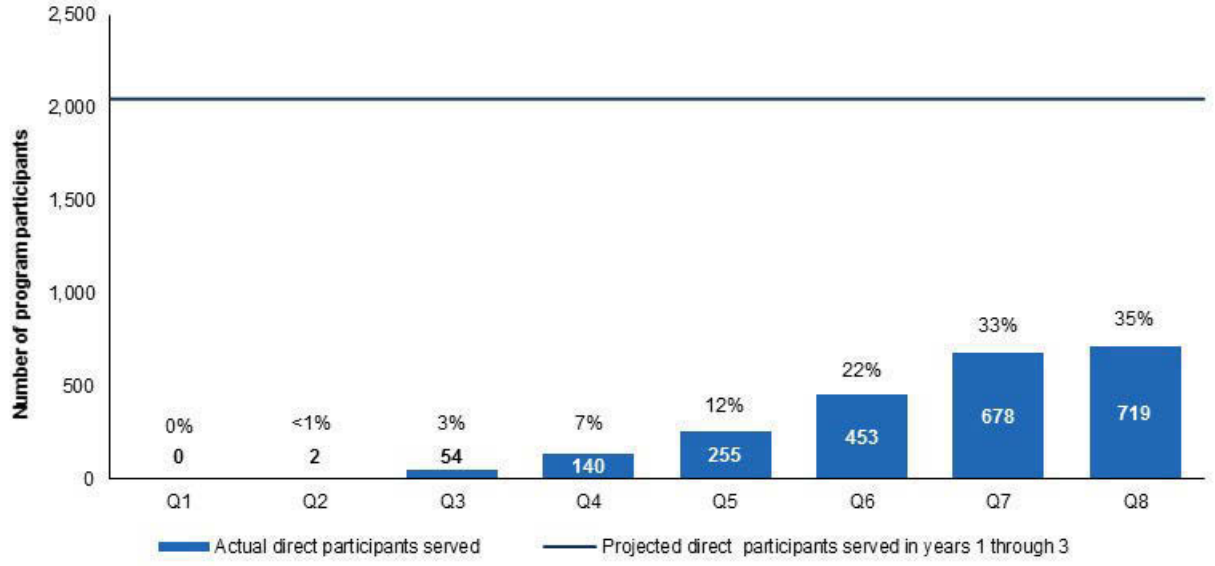
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on the University of North Carolina's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the University of North Carolina reported to the implementation and monitoring contractor that it directly served 719 participants from February 2015 (the launch of its program) through August 2016, which represents about 35 percent of its readjusted enrollment goal of 2,046 projected direct participants (Figure 1). The University of North Carolina also reported that it indirectly served 265 participants from February 2015 through August 2016, which represents about 33 percent of its readjusted enrollment goal of 800 projected indirect participants (Figure 2). The awardee did not originally expect to provide any services to indirect participants.

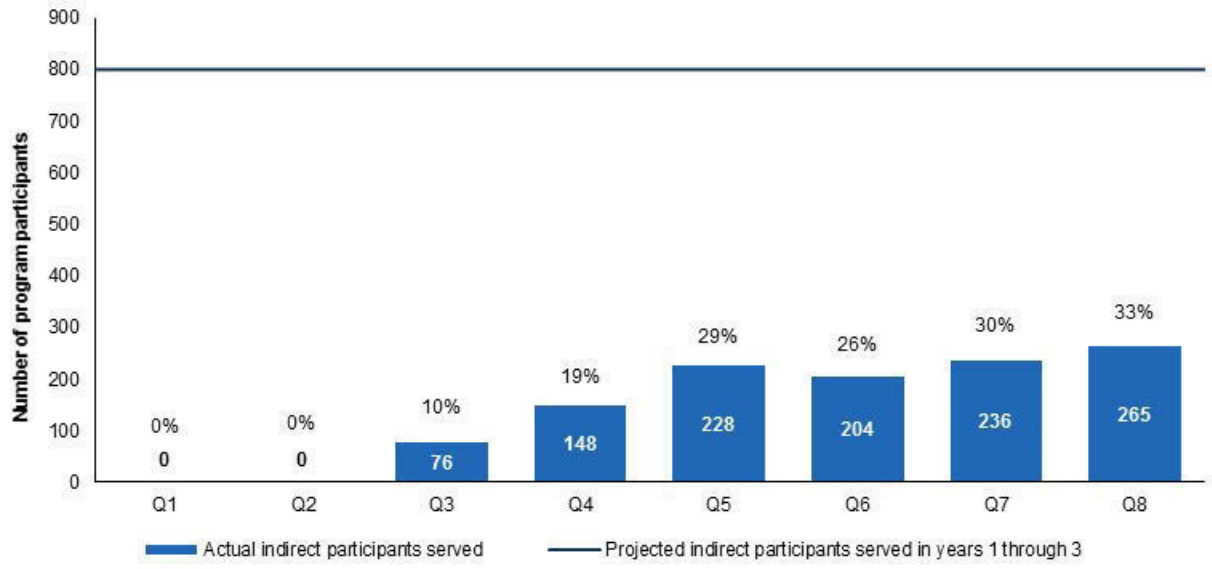
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016). These data are provided by the awardee and have not been verified.

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016). These data are provided by the awardee and have not been verified.

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter.

As mentioned above, the University of North Carolina recalibrated its enrollment goal early in the second program year in light of the lessons learned in the first year that indicated that it had overestimated the pool of potential Medicare and Medicaid enrollees. The awardee reported that the original enrollment projection was based on research conducted on commercially insured patients, rather than Medicare and Medicaid populations, which likely overestimated the prevalence of LBP.

To increase program enrollment in the second program year, the University of North Carolina undertook new strategies and enhanced existing ones. Enrollment facilitators included (1) a proactive enrollee identification process (through daily reviews of diagnosis code reports), (2) an expanded program service area, and (3) additional staff support for identifying potential participants. Although optimistic about these enhancements, BBC respondents still expressed uncertainty about meeting the revised three-year enrollment goal.

At the outset, the BBC program relied exclusively on participating providers to complete the LBP checklist with patients who presented with LBP and refer them to BBC program staff for potential enrollment in the program. Given low physician referral levels, however, program staff began generating and reviewing daily diagnosis code reports as a means for proactively identifying potential program participants. The awardee began using this enrollment strategy at the end of the first program year. Program staff reported it as a key facilitator for improved enrollment rates in the second program year that accounted for identifying more than half of new BBC participants.

A second facilitator of accelerated enrollment was the University of North Carolina's effort to expand the program to a larger service area, thereby increasing the potential pool of enrollees. The awardee recruited and trained 12 additional practices over the course of the second program year, for a total of 35 participating practices in the second year. Although this expansion improved overall enrollment figures, there were hurdles to overcome. For example, 4 of the largest practices added in the second year used EMR systems that operated on a different platform than those of practices already participating in the BBC program, which complicated the integration of the LBP checklist and the staff's ability to generate the daily diagnosis code reports. Adapting these EMR systems took months of BBC staff time—while working with the practices' health information technology staff—before the practices could pull reports to identify potentially eligible patients and have the EMR systems generate an LBP checklist.

A third facilitator of enrollment in the second program year was the awardee's effort to reconfigure its program staffing to accommodate the need to screen reports on diagnosis codes for potential BBC participants. The awardee converted the exercise physiologist from a part-time into a full-time role, with the additional hours allocated for her to assist care managers in reviewing daily diagnosis code reports and identifying potentially eligible patients. In addition, the awardee made arrangements for a Spanish-speaking care manager to assist with enrollment efforts, though few Spanish speakers have enrolled thus far.

A barrier to enrollment was the departure of one care manager during the second year. This temporary vacancy resulted in a screening and recruitment backlog for the remaining two care managers. The University of North Carolina hired and trained a new care manager in June 2016.

B. Implementation of the service delivery model

The University of North Carolina continues to be on track with implementation of its service delivery model. The awardee nonetheless continued to encounter similar facilitators and obstacles to implementation as during the first program year, and relied upon similar strategies to overcome them.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into two categories.

- **Implementation processes**, which comprise strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context**, which refer to the array of factors that may influence implementation. These factors may be emblematic of the organization itself, such as structural, political, and cultural characteristics, or of the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Implementation processes

The BBC service delivery model relies on having engaged primary care providers who use the LBP checklist as an evidence-based care delivery tool. Ensuring that providers regularly use

this tool remained a challenge in the second program year. BBC staff reported several factors they feel are having a promising effect on provider buy-in and engagement in the program.

One factor that program leaders feel facilitates engagement is the use of Provider Profile reports that document practice and provider use of selected evidence-based LBP practices. These reports allow providers to see their own utilization rates, make comparisons against their peers, and help them better understand when their patients may benefit from a change in service provision. In this way, the reports encourage providers to use the LBP checklist. They also reportedly sparked conversation about how to make imaging ordering patterns for LBP more consistent with evidence-based guidelines. Program staff and investigators reported greater interest from practices in the form of questions and requests for patient details since making the Provider Profile reports available, and noted that some providers are reconsidering their image ordering patterns and becoming aware of the number of potential participants for whom they failed to complete an LBP checklist.

The BBC program also reported that education and outreach to both providers and other office or practice-level staff facilitated implementation of the program. Specifically, BBC staff worked with nurses and medical assistants within practices to promote the program and encourage them to assist providers by initiating the checklists for them. BBC program staff reported that when practice support staff begin the checklist and provide input to the provider, the likelihood increases that the provider will complete the checklist during a visit with an acute LBP patient. The awardee is also planning to promote the BBC program and evidence-based care for LBP by disseminating guidelines for conservative care. BBC investigators will collaborate with the UNC Health Alliance on the development of the guide "Expected Practices in Acute Low Back Pain," in order to share best practices, such as how to reduce unnecessary imaging, learned during the course of the project. These expected practices are similar to guidelines except for the fact that they include specific measures against which providers can compare themselves.

Word of mouth about the BBC program's benefits to patients also served to facilitate provider engagement. Care managers reported that when providers hear about a patient who has benefited from the BBC program they are more likely to use the checklist, provide evidence-based care, and refer other patients to care managers for shared decision making and support.

However, even with these facilitators, multiple obstacles remain in improving provider engagement and increasing use of the LBP checklist to support conservative care delivery. For example, several of the practices added to the program in the second year were unable to integrate an electronic version of the LBP checklist into their workflow. The lack of an electronic platform for the checklist hindered the awardee's ability to implement evidence-based guidelines in these practices, as providers rarely use paper-based checklists. No specific strategies, beyond increased provider education and training, were identified by the awardee to overcome the challenge of low provider use of the paper-based checklist. One BBC leader suggested that, in retrospect, a simplified version of the program—that is, one that encouraged providers to use evidence-based LBP treatment through education and feedback alone, rather than expecting them to use a checklist—might have been more sustainable and just as effective.

Finally, an additional barrier to some providers' full engagement with the program may be that neither the chief nor the co-investigator are family practitioners and their primary

connections are with internists and physiatrists. To improve the effectiveness of educational and outreach efforts with these colleagues, the co-investigator identified a physician champion working at a family medicine practice.

2. Organizational and external context

Four organizational and external context features continue to pose barriers to the BBC program's service delivery: (1) competing demands on practices from an evolving health care system, (2) the FFS payment environment, (3) practices' organizational cultures, and (4) characteristics of the patient population.

Physician leaders from the practices with whom we spoke acknowledged there are often too many other competing demands for the BBC program to be a priority relative to other larger practice initiatives. Providers and BBC leaders reported that an increased focus on quality measurement for much more prevalent conditions in addition to pressures related to meeting meaningful use requirements or transforming practices into patient-centered medical homes (PCMHs) limited their ability to prioritize changing care delivery for the small number of patients presenting with LBP. Instead, providers often prioritize documentation and reporting for conditions relevant to a much larger proportion of their patient population and for performance measures that have more direct financial links to their compensation. The value proposition of participating fully in the BBC program, including using the checklists and being otherwise engaged, is low by comparison. In addition, the $50 incentive per completed LBP checklist being paid to practices is insufficient to foster significant engagement.

> "We just over the last year became a PCMH. And that entails a huge amount of work from staff and providers to jump through various hoops and do a variety of checklists. . . . There are also a variety of meaningful use measures that are federally mandated. And we're just two years into our new electronic health record, so everybody's just feeling a bit overwhelmed, but managing."
>
> *— Participating physician*

Furthermore, physician leaders noted that the FFS payment system and the broader health system culture of freely ordering imaging undermine conservative treatment of acute LBP. It can therefore be difficult to change provider behavior, particularly when imaging services are often available at the same location as the physician practice. One physician indicated that addressing the culture that supports inappropriate imaging will continue to be a challenge given the FFS payment system, unless imaging orders for patients with acute LBP are reviewed for appropriateness prior to being performed. At this time, BBC program staff rely on education and the Provider Profile utilization reports as the primary means of countering these challenges.

Some features of practice culture facilitate implementation of the BBC program, but the cultures of the participating practices vary widely. For example, care managers described one practice with a supportive culture in which providers regularly receive feedback about the program and the importance of evidence-based medicine from their own physician practice leaders, in addition to feedback provided by the University of North Carolina staff. This feature of the practice's culture contributes to its routine use of the LBP checklist. BBC program staff reported that this practice completes the checklist on every acute LBP patient, whether the patient is eligible for the BBC program or not. In contrast, some other practices with leaders and cultures that are focused on other competing priorities are unlikely to ever complete a checklist—regardless of BBC program feedback, education, or other forms of promotion by the

University of North Carolina staff. From the interviews, it is difficult to determine what factors separate one practice's challenges from another, though some seem better equipped, outside of the support of the BBC program staff, to participate more fully in the program.

The health context and characteristics of some BBC participants also challenged service delivery. BBC staff reported missed opportunities to serve certain segments of their enrollee population, particularly those who were Medicaid enrollees, citing their vulnerability and high level of need as complicating factors in service delivery. Care managers reported difficulties in outbound communications and follow-up, due to obstacles such as changes in address and nonworking phone numbers. Some Medicaid enrollees also disproportionately face lower transportation access, which impacts their ability to attend appointments. To overcome this challenge, BBC staff are scheduling appointments further in advance to allow participants time to make transportation arrangements. In addition, comorbidities such as obesity are prevalent among Medicaid patients with acute LBP and may take priority over addressing their LBP. Care managers also reported that some participants have difficulty remembering the BBC program interventions when contacted for follow-up, while others struggle to distinguish between BBC care manager calls and those of other nurses affiliated with their physician office. Program staff have not yet identified strategies to address many of these barriers.

C. Development of the payment model

The University of North Carolina did not make significant progress in developing its payment model in the second program year. Perhaps most challenging is the limited sample size in the BBC program's study (that is, the total number of participants and their associated claims). The sample is smaller than what was originally envisioned, preventing the awardee from being able to (1) detect statistically significant LBP prevalence and (2) estimate costs. However, the awardee said that it might be possible to do both within six months of the end of the award period once all Medicare claims data are made available for BBC participants. The implication is that calculation of overall medical expense savings from the BBC program will be difficult.

Compounding the challenge of conducting analyses based on a small sample size is the lack of identifiable Medicaid patient data. The awardee requested identified Medicaid data files on BBC participants from the Division of Medical Assistance in order to create a baseline cohort. The awardee confirmed that, after some delay, it would not be able to get Medicaid patient data directly from the division. The University of North Carolina Sheps Center for Health Services Research is negotiating with the division to reinstitute an agreement to obtain de-identified data on behalf of the awardee. Given this, the awardee will not be able to accurately assess changes in utilization patterns and costs (potential savings achieved) for the Medicaid portion of the BBC population served under the award.

The awardee described several other challenges in developing the payment model, beyond its small sample size and absence of identifiable Medicaid data. Specifically, payment model leaders mentioned a dearth of specialist-based bundled payment systems on which to base a bundle for the BBC program, which has led to uncertainty about how to attribute participants to a given specialist based upon typical time period and amounts of treatment provided.

Despite these challenges, the awardee has taken a number of steps to develop a viable payment model by using alternative approaches. For example, the University of North Carolina

payment model development team and its advisors are considering methods of incorporating BBC activities into larger, alternative value-based payment systems, in addition to exploring a potential bundled payment and a care management fee plus performance payment for BBC services.

The awardee also reported that Blue Cross and Blue Shield of North Carolina (BCBSNC), a member of its payment model team, expressed an interest in conducting an analysis of BCBSNC claims data to better understand resource use for acute LBP in a privately insured population. This analysis would include running sample commercial data through BCBSNC's analytic tool, which groups claims into clinical units of care. This tool is known as an episode grouper tool. This type of analysis would advance the awardee's understanding of the optimal services to include in a potential payment bundle related to caring for acute LBP.

The University of North Carolina received its first Medicare data set toward the end of the second program year and began to analyze the data. The awardee reported the following next steps in the data analysis process: (1) defining the cohort of LBP patients to which the payment model will apply, (2) measuring the resource utilization and costs for these patients, (3) identifying the methodology for provider attribution, (4) identifying the key quality outcomes to be measured, and (5) accurately gauging the costs of BBC services (that is, services not covered but provided under the cooperative agreement). The awardee anticipates selecting potentially feasible alternative payment models in the final program year.

IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

To be eligible for the BBC program, a prospective participant must be making a first visit to a participating provider for the treatment of acute, nonspecific LBP. The beneficiary should not have had another provider visit for LBP in the past six months, though a prior ED visit for LBP will not disqualify him or her from enrolling. In addition to English-speaking beneficiaries, the University of North Carolina has been enrolling Spanish-speaking beneficiaries. The target population excludes patients with fracture, high-impact trauma, significant neurologic impairment, cancer or risk for metastatic cancer, and those who are pregnant.

A. Baseline characteristics of the treatment group

The University of North Carolina began to enroll Medicare and Medicaid beneficiaries in the BBC program in February 2015. For the purpose of our evaluation, the treatment group consists of adult beneficiaries (age 18 years and older) in Medicare fee-for-service (FFS), Medicare Advantage, or Medicaid who were enrolled in the BBC program on or before May 31, 2016, according to lists from the awardee. The enrollment date is defined by the awardee as the date of the initial provider visit for LBP. For this report, we used the finder file received on August 4, 2016, which had 553 unique beneficiary records, including 373 records with Medicare only, 144 records with Medicaid only, and 3 records with dual Medicare-Medicaid status.

For the purpose of presenting baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS (both Parts A and B) with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all evaluation criteria for a period of at least 90 days within the baseline year (the 365 days immediately before their enrollment). The calendar period covered by the baseline quarters is based on the enrollment date for each participant and therefore varies by participant. In addition, the beneficiaries must have enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. These requirements, along with the exclusion of beneficiaries who did not have an identification number and those who could not be matched, eliminated 325 beneficiaries from the sample.

For this annual report, 228 Medicare beneficiaries met the above eligibility criteria and were included in the analysis of demographic and health status characteristics, as shown in Table 2. Just over half of them (53 percent) are age 65 to 74, whereas 24 percent are 75 to 84, and 18 percent are younger than 65. Most participants are female (57 percent) and white (75 percent); 23 percent are black. Twenty-eight percent of participants were originally enrolled in Medicare because of a disability. Fewer than 0.5 percent were originally enrolled because of end-stage renal disease (ESRD). Twenty percent of participants are dually eligible for Medicare and Medicaid, although in some cases Medicaid benefits may be restricted to the payment of co-insurance and deductibles. The average hierarchical condition categories (HCC) risk score of participants (0.95) is less than the average for Medicare FFS beneficiaries nationwide (1.0). Seventy-five percent of participants have an HCC score of 1.12 or lower, and 50 percent have a score of 0.71 or lower. Thus, BBC program participants are slightly healthier than the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 228)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	42	18
65 to 74	121	53
75 to 84	55	24
85 and older	10	4
Gender		
Female	129	57
Male	99	43
Race		
White	170	75
Black	52	23
American Indian, Alaska Native, Asian/Pacific Island American, or other	2	0.88
Hispanic	3	1
Original reason for Medicare eligibility		
Old age and survivor's insurance	163	71
Disability insurance benefits	64	28
ESRD[a]	1	0.44
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	45	20
HCC score[c]		Statistic
Mean		0.95
25th percentile		0.5
Median		0.71
75th percentile		1.12

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary made an initial visit to a physician for acute, nonspecific low back pain. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Consistent with the mean HCC risk score, which was slightly below the national average, participants did not have high Medicare expenditures or high rates of service use in the 365 days before enrollment. Table 3 shows baseline expenditure and health care utilization data for a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation. Given that the University of North Carolina intends to reduce overall Medicare spending primarily by reducing the use of imaging and injections, findings from our analysis of baseline cost and utilization data for LBP-related imaging, injections, and provider visits are included in this report.

The following six measures increased in the fourth baseline quarter: (1) number of outpatient ED visits, (2) percentage with an outpatient ED visit, (3) percentage with a 30-day readmission among all discharges, (4) percentage of participants with a readmission among all participants, (5) percentage of participants with LBP-related imaging, and (6) percentage of participants with an LBP-related provider visit. Although the awardee excludes beneficiaries with a history of LBP in the past six months, the presence of LBP-related imaging and provider visits in the last two quarters may represent imaging and provider visits in the outpatient ED setting, which would not disqualify a beneficiary from enrolling in the program. In the last baseline quarter, 40.3 percent of participants who had an LBP-related provider visit also had an outpatient ED visit.

We did not note a pattern from one baseline quarter to the next in the remaining expenditure and utilization measures. We will continue to monitor baseline expenditures and utilization each quarter to determine whether different patterns emerge as the sample size increases.

We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. The total average PBPM Medicare payment of $576 during the baseline year was much lower than the national average of approximately $792.[3] Average PBPM Medicare payments for acute inpatient ($220), physician ($164), and outpatient ($150) services were the largest drivers of the total cost of care.

During the baseline year, the rate of acute care hospitalizations was 201 per 1,000 Medicare FFS beneficiaries per year, whereas the rate of ED visits not resulting in a hospitalization was 407 per 1,000 beneficiaries per year. Fourteen percent of participants had at least one hospitalization during the baseline year, and 24 percent had at least one ED visit. The rate of ED visits per 1,000 beneficiaries per year was higher in baseline quarter 4 (597) than in baseline quarters 1 through 3 (272 to 404). Twelve percent of participants had at least one ED visit during baseline quarter 4. The rate of primary care visits in any setting in the baseline year was 5,292 per 1,000 Medicare FFS beneficiaries per year, and the rate of specialist visits in any setting was 8,087 per 1,000 beneficiaries per year.

In the baseline year, 8 percent of all hospital discharges in the treatment group were followed by a readmission in the 30-day post-discharge period. At the participant level, however,

[3] See the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

only one percent of all beneficiaries had a hospitalization with a readmission in the 30-day post-discharge period. The percentage of participant-level hospital discharges with a 30-day readmission in the baseline year was lower than the national average for Medicare beneficiaries (18 percent).[4] Readmissions were noted only in the third and fourth baseline quarters.

We examined three awardee-specific measures in the baseline year: the rate of participants with LBP-related imaging, injections, and provider visits. Thirty-five percent of all participants had at least one LBP-related provider visit, whereas 13 percent of all participants had LBP-related imaging, and one percent received LBP-related injections. The percentage of participants with LBP-related imaging and provider visits was highest in baseline quarter 4, compared with quarters 1 through 3. Although the presence of LBP-related imaging and provider visits in the last two baseline quarters appears to run counter to the inclusion criterion of no LBP-related history or provider visit in the past six months, as previously stated, 40.3 percent of participants with an LBP-related provider visit in the last quarter also had an outpatient ED visit, which is permitted by the awardee. In addition, LBP-related imaging may reflect imaging that took place during outpatient ED visits. Our identification of LBP-related visits in the last two baseline quarters may also be related to the differences between our methodology and that of the awardee. The awardee identifies LBP-related visits on the basis of a review of the patient's EMR, which captures visits within the University of North Carolina system only. We have identified LBP-related visits on the basis of diagnosis codes reported on outpatient and carrier claims, which makes our approach more comprehensive. In the future, we will examine the number of LBP-related visits per beneficiary in the last two baseline quarters. As we plan for constructing the comparison group, we will determine the best approach for applying the criterion of no LBP-related provider visit in the past six months. We will consider excluding all beneficiaries with LBP-related visits in the last six months before enrollment versus matching on the basis of the percentage of treatment group beneficiaries for whom LBP-related visits appear on claims.

As we begin to conduct post-intervention analyses, we will enhance our reporting of participants' expenditure and utilization characteristics. Given that the treatment effect may vary for certain subgroups of patients, we will report, as the sample size permits, the percentage of participants who on an a priori basis may differ in their response to the intervention. Potential subgroups include the following: (1) participants whose first visit for LBP was with a primary care provider versus those whose first visit was with a specialty provider; (2) participants with a history of LBP (before the six-month pre-intervention period) versus those without this history; (3) participants with other musculoskeletal comorbidities (upper- or lower-extremity arthritis or surgery based on claims in the past one or two years) versus those without musculoskeletal comorbidities; and (4) participants with chronic conditions (for example, diabetes, heart failure, or chronic obstructive pulmonary disease, based on claims in the past one or two years) versus those without these conditions.

[4] See the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	228	214	220	228	228
Average Medicare expenditures PBPM[a]					
Total	576 (121)	464 (81)	669 (156)	571 (119)	484 (98)
Acute inpatient	220 (83)	110 (45)	291 (124)	241 (97)	160 (75)
Inpatient other[b]	1 (1)	2 (2)	3 (3)	0 (0)	0 (0)
Outpatient[c]	150 (23)	146 (30)	177 (54)	145 (32)	123 (19)
Physician services	164 (14)	155 (16)	169 (18)	157 (14)	165 (18)
Home health	16 (6)	17 (9)	14 (8)	16 (7)	16 (9)
Skilled nursing facility	10 (17)	16 (15)	0 (0)	0 (0)	5 (5)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	15 (5)	18 (11)	15 (6)	11 (5)	15 (4)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	201 (95)	136 (56)	202 (64)	215 (110)	158 (57)
Outpatient ED visits	407 (88)	272 (102)	404 (146)	287 (120)	597 (125)
Observation stays	69 (17)	58 (33)	55 (31)	125 (46)	35 (25)
Primary care visits in any setting	5,292 (296)	5,002 (433)	5,670 (465)	5,159 (471)	5,284 (389)
Primary care visits in ambulatory settings	4,848 (273)	4,476 (356)	5,138 (417)	4,729 (385)	4,986 (365)
Specialist visits in any setting	8,087 (616)	7,746 (885)	8,367 (856)	8,026 (739)	7,953 (685)
Specialist visits in ambulatory settings	7,131 (562)	7,045 (794)	7,211 (780)	7,094 (700)	7,022 (617)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	14 (2)	3 (1)	5 (1)	5 (1)	4 (1)
Percentage with an outpatient ED visit[e]	24 (3)	5 (2)	7 (2)	7 (2)	12 (2)
Percentage with an observation stay[f]	7 (2)	1 (1)	1 (1)	3 (1)	1 (1)
Percentage with a 30-day readmission among all discharges	8 (4)	0 (0)	0 (0)	13 (13)	14 (10)
Percentage of participants with a readmission among all participants	1 (1)	0 (0)	0 (0)	0.4 (0.4)	1 (1)
Awardee-specific measures					
Percentage of participants with LBP-related imaging	13 (2)	2 (1)	2 (1)	4 (1)	7 (2)
Percentage of participants with LBP-related injection	1 (1)	0.5 (0.5)	0.5 (0.5)	1 (1)	0.4 (0.4)
Percentage of participants with LBP-related provider visit	35 (3)	10 (2)	10 (2)	13 (2)	21 (3)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: University of North Carolina

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	301
Projected Medicaid population with 6 months of program exposure	Not applicable
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	7,366
Likelihood of all-cause hospitalizations	4,503
MDE sample size requirement to detect 20% effect	
Total expenditures	1,842
Likelihood of all-cause hospitalizations	1,126
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Clinician survey
Implementation data that will be analyzed	None

We do not expect to conduct a rigorous estimate of the impact of the University of North Carolina's BBC intervention. The projected sample size is too small to detect an effect of 20 percent on Medicare spending. Furthermore, as noted above, some beneficiaries who appear in the finder file may have previously received treatment for back pain. These beneficiaries were probably enrolled in the program because there was no indication of prior treatment in the university's EMR. However, analysis of Medicare claims did identify this earlier treatment.

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V. NEXT STEPS

A. Implementation evaluation

As the University of North Carolina enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

At this point, we project that the final sample size for the BBC program may be insufficient to support an impact estimate. Hence, we cannot be sure that such analyses will be carried out. If the sample size permits, we plan to identify comparison practices from metropolitan areas outside of the Research Triangle region because the awardee's recruitment efforts may saturate that region. Once comparison practices have been identified, we will draw from the practices Medicare (and Medicaid, if available) beneficiaries who are age 18 and older and who meet the awardee's inclusion and exclusion criteria. We will examine both claims-based algorithms reported in the literature as well as the awardee's list of eligible diagnosis codes to identify patients with acute, nonspecific LBP for the comparison group and for the pre-intervention period treatment group.

We will validate any claims-based algorithms we use by examining diagnosis and procedure codes reported on post-intervention beneficiary claims, to ensure that we are identifying comparison and pre-intervention treatment beneficiaries with a similar set of codes. We will be unable to replicate the awardee's inclusion criterion of pain duration of less than three months by using claims data. However, the awardee states that this can be assumed if the patient does not have any LBP-related claims in the past six months. Lastly, we will include Spanish speakers in the sample for the period after which they became part of the program, attempting to match the proportion of English and Spanish speakers.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering a survey of clinician staff affiliated with the program. Eligible clinicians will include physicians who have seen at least two or three patients with lower back pain a month. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.

We also administered a non-clinician survey as part of our virtual site visit with three full-time care managers and the exercise physiologist affiliated with the program. The survey focused on these staff members' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We expect to report the results of the survey in the third annual report in January 2018.

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APPENDIX B.29.

REGENTS OF THE UNIVERSITY OF CALIFORNIA AT SAN DIEGO

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MATHEMATICA Policy Research

REPORT

APPENDIX B.29

HCIA Round Two Evaluation: Regents of the University of California at San Diego

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Heart Attack and Stroke Free Zone (HSF-Z) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Regents of the University of California at San Diego's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of California at San Diego made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the University of California at San Diego and its implementing sites addressed the issues identified during the first program year? What factors have influenced their ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the University of California at San Diego's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the HSF-Z program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of California at San Diego is using funds from HCIA R2 to implement the HSF-Z program, an effort to improve primary care for patients who are at an elevated risk for cardiovascular disease. Key program characteristics are shown in Table 1. The goals of HSF-Z are to reduce the incidence of heart attacks and strokes in San Diego County, along with their associated health care costs and mortality. HSF-Z is led by the University of California at San Diego in partnership with 10 San Diego–area medical groups, which represent the majority of all medical care provided in San Diego: (1) Sharp Rees Stealy, (2) the Scripps Foundation, (3) the University of California at San Diego Family Medicine Group, (4) Vista Community Clinic, (5) Neighborhood Healthcare, (6) Arch Health Partners, (7) San Ysidro Health Center, (8) the North Coast Family Medical Group, (9) the University of California at San Diego Internal Medicine, and (10) North County Health Services.

The target population for the program is Medicaid, Medicare, and dually eligible patients who are at high risk for a major adverse cardiovascular event such as a heart attack, stroke, or sudden cardiac death. Patients in palliative care, those with less than six months of life expectancy, and those with end-stage renal disease (ESRD) are not eligible. In addition, patients are not eligible if they have met the health goals for their condition and are on the recommended medication bundles for their condition. Each participating medical group identifies and recruits eligible patients into the project with support and materials from staff at the University of California at San Diego. The target enrollment goal for all three years of the program is 3,600 participants.

The University of California at San Diego intends to improve patient health by raising their awareness of cardiovascular risk factors; introducing evidence-based medications; and providing supportive, ongoing health coaching to patients. Health coaches work with physicians to ensure that patients are put on appropriate, evidence-based medication bundles for hypertension, diabetes, and other cardiovascular disease risk factors. They also provide health education and engage participants in their care in order to improve compliance with the drug regimens and to encourage lifestyle changes. The awardee is also introducing wireless home blood pressure monitors, which, as of Year 2, are being used to transmit results to a website that is accessible to program staff and participants. The HSF-Z program is supplemented by a community-wide patient education effort concerning the risks for cardiovascular disease (the “Be There” program) and a long-standing physician education effort.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the University of California at San Diego during the first year of its cooperative agreement.

- The HSF-Z program has gained the support of the leaders and physicians at the implementing sites. The leadership team at University of California at San Diego is fully staffed and has engaged with each of its implementing sites to help them meet the program goals. For instance, the team has provided one-on-one and group trainings, presentations, and implementation advice that specifically meet the needs of each group.
- Each medical group has an on-site physician champion who helps to ensure that the program is implemented smoothly.

We also identified several initial challenges in implementing the program and the University of California at San Diego's strategies for addressing them.

- There were significant delays in receiving institutional review board (IRB) approval. The awardee had to submit several revised applications before securing approval. These delays pushed back the launch date of the program, which is one reason that medical groups were behind in meeting their enrollment goals. The University of California at San Diego reported that most groups are now on track with meeting their enrollment goals.
- Recruitment and enrollment have proven to be more challenging than the University of California at San Diego leaders and the implementing sites originally envisioned. Several of the implementing sites generated lists of all eligible patients from medical records and then "cold called" potential participants. Because this approach did not produce enough participants, the sites have since implemented other strategies, such as engaging patients at other times (for example, during an appointment) and expanding the program to other locations in order to have a larger eligible population.

Finally, we identified several early lessons learned by the University of California at San Diego in implementing its program.

- The awardee learned that the way in which program information is presented to different types of patients can affect their decision to participate. For instance, the University of California at San Diego and the implementing sites expected that many more eligible patients would have agreed to participate in the program because it was free and good for the patients' health. When this did not happen, the awardee saw that it was sometimes better for providers to be the first ones to introduce the program to their patients and for health coaches to play a role in this process because they understand the patients' culture and how it affects their view of their health.
- Leaders at the University of California at San Diego personally introduced the program to providers at each implementing site. This approach has also been useful in encouraging provider engagement and improving recruitment rates.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of California at San Diego made progress in the following areas:

- New staff were hired both at the leadership level and at the implementing sites to support enrollment, patient follow-up, and project management activities.
- The implementing sites have continued to make changes in and customize their recruitment, enrollment, and program workflow strategies in order to be more effective.

Over the past year, the University of California at San Diego also made several changes to its program:

- Two implementing sites were added, and several existing sites expanded to new clinics.
- Awardee leaders extended the enrollment period by three months in order to help the implementing sites meet their enrollment goals.

Below we note the key challenges that the University of California at San Diego has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Enrollment remained a challenge for the implementing sites because a number of eligible patients declined to participate in the program. To address this issue, providers at some sites have become more involved in the recruitment process, and staff mentioned that they have allotted more time upfront to patient education as needed.
- Keeping participants engaged in the program has also been a challenge now that the health coaches' workload has increased as a result of increasing enrollment. The implementing sites have hired new staff and/or have increased existing staff's time in order to help with follow-up calls.

As the University of California at San Diego enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- According to the implementing sites, it will be a challenge to find the resources to sustain the intervention—and the employee health coaches in particular—after the HCIA R2 funding ends, but they remain optimistic. Awardee leaders and the implementing sites hope to secure funding from other grants.
- The University of California at San Diego expects to continue to build successful linkages between communities, medical organizations, payers, and other stakeholders in order to strengthen its proposed population health payment model, known as an "accountable health community" (AHC).

Table 1. University of California at San Diego: HSF-Z characteristics at a glance

Characteristic	Description
Purpose	To prevent heart attacks and strokes in San Diego County by achieving better control of hypertension and cardiovascular disease risk factors
Components	• Care management through health coaches, including medication management • Patient and provider engagement and support
Target population	Medicaid, Medicare, and dually eligible beneficiaries who are at high risk for a major adverse cardiovascular event—defined as a heart attack, stroke, or sudden death due to cardiovascular complications
Theory of change/theory of action	Providing participants with a health coach and appropriate evidence-based medication will reduce the incidence of cardiovascular events, improve survival rates, and reduce overall health care costs.
Payment model	New fee-for-service (FFS) payment and value-based payments
Award amount	$5,820,416
Launch date[a]	January 19, 2015
Setting	Provider based (primary care physicians)
Market area	Urban, suburban
Market location	San Diego County
Core outcomes	• Percentage of participants who died • Experience of participants with physicians and physician office staff (data come from the Clinician and Group Consumer Assessment of Healthcare Providers and Systems survey [CG-CAHPS]) • Total Medicare Part A and B cost calculations • Decrease in the emergency department (ED) visit rate • Decrease in the incidence of major adverse cardiac events • Increase in the percentage of participants adhering to medications

[a]After the initial planning period, the awardee's program began to operate as of this date.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of California at San Diego in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 14 through July 12, 2016. For the analyses of the University of California at San Diego's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders at the University of California at San Diego
- Project directors and health coaches at four of the implementing sites

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the University of California at San Diego's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

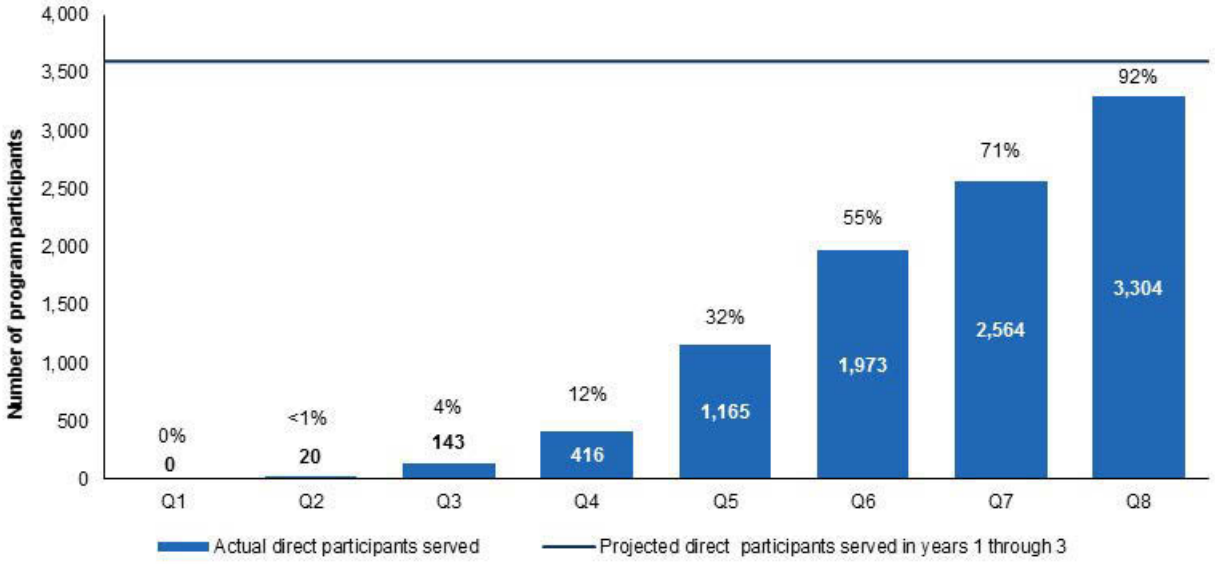
A. Program enrollment

Overall, the University of California at San Diego reported to the implementation and monitoring contractor that it directly served 3,304 participants from January 2015 (the launch of its program) through August 2016, which represents about 92 percent of its 3,600 three-year, projected number of participants (Figure 1). Interview respondents reported that enrollment was

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

on target and attributed this progress primarily to the sites' success in identifying effective approaches to identifying eligible patients, hiring more staff, and expanding the number of implementing and recruitment sites. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. UCSD does not have indirect program participants.

Two teams (Arch Health Partners and Sharp Rees Stealy Medical Group) within UCSD have exceeded their patient enrollment targets. Both teams have agreed to increase their targets and continue to enroll new patients.

The University of California at San Diego's progress in meeting its three-year enrollment goals was influenced by several factors, some of which facilitated this progress and others which hindered it. The facilitators included expanding the implementing and enrollment sites, hiring staff, extending the enrollment period, increasing physician engagement with the program, streamlining the patient identification process, and adapting the enrollment process to the sites' organizational context.

Over the past year, the University of California at San Diego added two implementing sites to the HSF-Z program. Several implementing sites also expanded their enrollment efforts to additional clinics, allowing program staff to recruit more patients. Finally, two sites that had met their enrollment goals modified their contracts with University of California at San Diego to enroll more patients.

Several implementing sites have hired additional health coaches. One site did so to provide coverage at different clinics. At another site, in which the health coaches previously split their time between HSF-Z and other projects, the coaches are now full-time staff on HSF-Z, allowing them to focus more fully on enrollment activities.

Awardee leaders added an associate director of programs and a data manager. The associate director helps to organize, coordinate, and maintain communication between the implementing sites. The data manager helps with the day-to-day data collection activities and with the long-term data collection and management strategy and data analysis.

Enrollment was initially scheduled to end in May 2016, but the awardee extended the enrollment period to the end of August 2016. Sites that had not met their targets by the original cut-off date reported that the additional time has been very helpful.

The implementing sites reported an increase in provider engagement in the program over the past year. They reported various reasons for this increase, including physicians seeing the benefits of the program, a general increase in awareness of the program in the implementing sites because of health coaches' outreach efforts, and visits made by program leaders at the University of California at San Diego to present the program to physicians and answer their questions.

> "The providers are becoming more engaged, and they are more willing to talk to their patients [about the project] than they were a year ago."
>
> *— Health coach*

Respondents noted that some patients were more likely to enroll in the program if they were first approached by their own physician rather than the health coach. Physicians who are more engaged and familiar with the program and its eligibility criteria have also improved the sites' ability to identify patients. One site noted that some patients who were not flagged as potentially eligible through its patient registry were identified by physicians and turned out to be eligible for the program.

The implementing sites continued to identify ways to better identify patients who are eligible for the program. For instance, one site has optimized its patient registry so that program staff can search for patients with cardiovascular risk factors who are due for their annual physical exams. Another site that was initially offering the program only to patients with diagnoses of high blood pressure, cholesterol, or diabetes is now calculating the 10-year cardiovascular event risk score[3] for patients and using this information to identify patients who might benefit from the program. This site noted that the majority of patients in its practice who qualify for the program were identified through this new approach.

Sites are taking different approaches to enrollment based on their organizational context. One site enrolls all patients in person. This site believes that this approach may have initially

[3] The 10-year cardiovascular event risk score estimates a patient's risk of coronary death, heart attack or stroke within the next 10 years. The score is based on an algorithm published in the 2013 American College of Cardiology/American Heart Association Guideline on the Assessment of Cardiovascular risk.

slowed down recruitment, but it later helped to optimize the enrollment process by allowing the staff to fully and properly complete the enrollment forms and surveys for each patient.

Some sites have been enrolling patients by mailing or emailing the program forms to them and having them return the forms by mail or email. This approach has been the best one for their patient populations. One site has found "warm hand-offs" to be an effective enrollment approach. The provider introduces the HSF-Z program to the patient during a regular appointment and refers the patient to the health coach for program enrollment directly after the appointment.

Another site that was initially recruiting patients when they came into the clinic for an appointment is now scheduling patients to come into the clinic solely for enrollment. Staff at this site noted that this approach has improved their ability to reach eligible patients.

The University of California at San Diego and its implementing sites have identified two barriers to meeting their enrollment goals. First, the rate of eligible patients who declined to participate continues to be higher than expected. The sites reported that this happened because some patients do not feel that the program will be helpful to them, whereas others have concerns about the statin medications that are a required part of the medication bundle. In some cases, reluctant patients have been motivated to enroll after their provider has endorsed the program and explained the benefits of participation. The University of California at San Diego believes that continuing to increase physician involvement will contribute to greater enrollment.

Second, although not a major challenge, several sites noted the challenge of keeping participants engaged in the program when they feel as if they are doing well and no longer want the services provided by health coaches. Sites also reported that a small percentage of patients have disenrolled from the program for many reasons, including being lost to follow-up, family emergencies, and personal illness.

B. Implementation of the service delivery model

The University of California at San Diego and its implementing sites continue to be on track with program implementation and did not make significant changes to the HSF-Z model in the second program year. In addition to providing enrollment support, health coaches continued to work closely with participants to provide education and follow-up as well as linkages to relevant community resources.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the

implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The implementing sites have been given latitude to adapt the intervention staffing to their organization and their populations. For example, beyond the health coaches, each site has staffed the program with a different mix of registered nurses, case managers, and pharmacists. The sites have also continued to hire more staff. In addition to adding health coaches, some sites have added pharmacists to work part time. The flexibility to staff their programs according to their population, organization, and resources has been helpful.

2. Implementation processes

As enrollment increases, the health coaches' caseloads at the implementing sites are also increasing. The University of California at San Diego reported that the staffing ratio is approximately 300 patients per health coach. Many sites feel that this ratio is too high, and the awardee is working with the site teams to better understand ideal staffing ratios. The sites are also making the most of internal resources to implement the program. For example, at one site that employs care coordinators for other interventions, some of these other coordinators are helping the health coaches with patient follow-up when possible.

The University of California at San Diego provides health coaches and sites with training and technical assistance, including convening two in-person training sessions for the health coaches annually. The awardee also holds monthly meetings with the health coaches. The sites reported that these in-person sessions and the monthly health coach meetings are useful. These meetings provide an opportunity for health coaches to learn from each other and troubleshoot common challenges together.

> "I think once the burden of enrollment is off, it will be a lot easier for us to get to know our patients more. It will be a lot easier to do the individual goal setting and to give them more personalized attention."
>
> *— Health coach*

Enrollment and outreach activities have been a major focus of the implementing sites to date. Several sites reported that maintaining the momentum of enrollment activities while continuing the monthly follow-up with participants has been a challenge for health coaches, given the volume of patients. The awardee and its sites noted that this challenge will be addressed when the enrollment period is officially closed in August 2016, as this will allow health coaches to focus solely on follow-up activities.

A major component of the HSF-Z program is medication therapy management. Results from University of California at San Diego's monitoring and management plan showed that over 90 percent of participants adhere to the medications in the bundle, and adherence has remained high since the program was launched. For example, the percentage of all patients who reported taking ACE Inhibitors or Angiotensin II Receptor Blockers six to seven times per week went from 65 percent to 89 percent. Sites reported being proactive about ensuring that providers are aware of

which patients are involved in the intervention and that they are prescribing the recommended medications to these patients.

The awardee successfully launched a pilot for the wireless blood pressure cuff component in three implementing sites. The sites are currently enrolling HSF-Z participants to participate in the pilot.

3. Organizational and external context

For all implementing sites, the organizational and local characteristics have significantly influenced the implementation of HSF-Z. For instance, one site reported that it has had a long-standing, broader focus on improving hypertension outcomes and is involved in several initiatives in this area. The leaders at this site believe that the HSF-Z program at their location owes its success to the organization's commitment to participating in initiatives like HSF-Z. Another site that is involved in another grant program with a goal that is similar to the HSF-Z goal noted that this involvement has helped to focus efforts in its organization. Another site felt that strong project management support has been invaluable. By tracking the efficiency of the health coaches and maintaining communication between all members of the team, the site staff helped to streamline enrollment and optimize staffing.

Some sites continue to experience challenges specific to their patient population. Two sites that serve primarily low-income populations have found that following up with patients was more time-consuming than expected because patients do not have a phone, or their number has been disconnected. Health coaches at these sites noted that flexibility was important to overcoming communication challenges. The coaches have adopted various strategies to better reach patients, including meeting them in person when they come in for appointments or trying to make a phone appointment with them for a specific time.

C. Development of the payment model

The University of California at San Diego has proposed a payment model with two components. The awardee described the first component as being more traditional in that it involves developing strategies related to existing sources of funding, such as grants or insurance reimbursements, so that participating sites can continue to employ their health coaches after the cooperative agreement ends. Awardee leaders stated that they are beginning to have conversations with each of the 10 participating sites and will continue to do so in the upcoming year to discuss how each organization might be able to pay for its health coaches in the future.

In order to facilitate this process, the awardee is encouraging each organization to think about (1) the value added by health coaches to their organization, to their providers, and to their patients and (2) how the University of California at San Diego can help the organization quantify that value. The awardee is also helping HSF-Z staff at the implementing sites to begin to consider whom they might need to talk with both internally (such as their leaders) or externally (such as payers or partners they might consider approaching for funding) in order to make their program sustainable. Some of the implementing sites stated that they are still unsure about whether they will have the resources to sustain the intervention after the HCIA R2 funding ends, but they believe there is a lot of potential for obtaining funding and that it makes sense to continue these discussions.

The second component of the proposed payment model involves the awardee thinking about its program at a macro level. The University of California at San Diego has proposed a population health payment model based on a new type of entity called the California Accountable Communities for Health Initiative. This new category of provider involves a broad coalition of stakeholders including an accountable communities for health "integrator" entity (the University of California at San Diego) as well as patients, payers, and health care organizations, among others. The accountable communities for health is the foundation for the University of California at San Diego not only to continue its clinical work but also to begin to do more work related to fostering relationships between stakeholders in the community. The awardee stated that it is building these community linkages between providers, payers, and other stakeholders by continuing to have conversations with these players related to funding opportunities. This year, the University of California at San Diego applied for funding beyond the HCIA R2 award and has thus far been contacted informally by one funder. The awardee also reported that it continues to look for other ways to position itself to respond to new opportunities as they become available.

The next step in the University of California's proposed payment model in Year 3 is to provide the implementing sites as well as other stakeholders with outcomes data. For the implementing sites, the University of California at San Diego is hopeful that the outcomes data will help each organization continue to build its own internal sustainability strategy. For external stakeholders, the awardee is hopeful that the data will show not only that it has been able to generate savings but also how these savings could be reinvested into the AHC and thus the community as well.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents baseline characteristics of the treatment group, which we measured during the 12 months before each beneficiary's enrollment date for the HSF-Z program. For the purpose of our evaluation, the treatment group consists of eligible patients at high risk of heart attack or stroke who were successfully recruited by participating physician practices. Ideally, to support an intent-to-treat evaluation, the treatment group would also include eligible patients who were recruited but refused to participate in the program. However, the University of California at San Diego was unable to obtain the identities of these patients.

A. Baseline characteristics of the treatment group

Participating physician groups began to enroll Medicare and Medicaid beneficiaries in the HSF-Z program on January 19, 2015. As of the end of May 2016, the program had 3,481 participants, of which 1,643 participants were linked to administrative records. Of these, 694 participants were FFS Medicare beneficiaries, 175 participants were Medicaid beneficiaries, and 298 participants were dually eligible for Medicare and Medicaid. The remaining participants included 476 individuals whom we were unable to link with administrative data.[4] In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, a total of 653 participants were included in the analysis of baseline characteristics for this report.

These Medicare FFS beneficiaries look generally similar to the Medicare FFS population nationwide. Their characteristics are shown in Table 2. Beneficiaries younger than age 65 account for 9 percent of program participants, while 62 percent are age 65 to 74. Only 3 percent are older than age 85. The percentage of females is slightly lower than the national average for all Medicare FFS beneficiaries: 51 percent versus 54 percent. The Medicare FFS beneficiaries in the program are also less likely than the general population of Medicare FFS beneficiaries to have been eligible for Medicare because of a disability (15 percent versus 24 percent). They are more likely to have been eligible because of old age and survivor's insurance (84 percent versus 76 percent). One percent were eligible because they had end-stage renal disease (ESRD).

[4] Some of the larger participating health systems failed to report social security numbers, HICs, or other insurance numbers, such that this information was lacking for a majority of participants. For most of these enrollees, we were able to link to claims by using name, date of birth, gender, and zip code. The University of California at San Diego has been in discussion with its participating health systems and has indicated that at least some of the missing data will be forthcoming in future finder files.

The percentage that is dually eligible for Medicare and Medicaid is 18 percent. The average hierarchical condition categories (HCC) risk score of 1.09 is modestly higher than that of the overall Medicare FFS population. The HSF-Z program appears to have a somewhat greater number of predicted higher-cost patients relative to the national Medicare FFS beneficiary population, as indicated by the interquartile range of the HCC score (0.47 to 1.34 versus 0.49 to 1.25).

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 653)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	57	9
65 to 74	408	62
75 to 84	168	26
85 and older	20	3
Gender		
Female	332	51
Male	321	49
Race		
White	506	77
Black	30	5
American Indian, Alaska Native, Asian/Pacific Island American, or other	55	8
Hispanic	52	8
Original reason for Medicare eligibility		
Old age and survivor's insurance	549	84
Disability insurance benefits	96	15
ESRD[a]	8	1
Hospice[b]		
Medicare/Medicaid dual status, percent dual[b]	120	18
HCC score[c]		Statistic
Mean		1.09
25th percentile		0.47
Median		0.81
75th percentile		1.34

Table 2 *(continued)*

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary consented to participate in the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Table 3 shows baseline utilization and expenditure data for a common set of measures, including the Center for Medicare & Medicaid Innovation's (CMMI) four core measures. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $815, which was slightly higher than the national average in 2014 ($792). Among HSF-Z participants, the average PBPM Medicare payment for physician services ($283) and for acute inpatient care ($245) were the largest drivers of the total cost of care in the baseline year. The rate of acute hospitalization among HSF-Z participants (209 per 1,000 participants) remained below the 2014 national average (274 per 1,000 beneficiaries). The rate of emergency department (ED) visits not resulting in a hospitalization or in an observation stay also remained notably lower than the national average (382 per 1,000 participants versus 652 per 1,000 beneficiaries).

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	653	607	634	652	653
Average Medicare expenditures PBPM[a]					
Total	815 (62)	860 (108)	891 (106)	806 (94)	709 (71)
Acute inpatient	245 (31)	302 (79)	261 (63)	259 (56)	166 (43)
Inpatient other[b]	14 (6)	16 (15)	7 (7)	7 (7)	25 (18)
Outpatient[c]	190 (27)	193 (27)	200 (37)	208 (44)	159 (20)
Physician services	283 (15)	290 (25)	286 (23)	269 (17)	287 (17)
Home health	33 (6)	24 (8)	43 (11)	33 (7)	32 (8)
Skilled nursing facility	31 (9)	22 (14)	76 (31)	15 (7)	12 (8)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	19 (3)	13 (2)	18 (3)	15 (5)	29 (11)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	209 (23)	195 (40)	226 (41)	238 (44)	178 (36)
Outpatient ED visits	382 (48)	323 (67)	369 (71)	357 (70)	472 (70)
Observation stays	40 (12)	47 (18)	19 (11)	25 (12)	67 (24)
Primary care visits in any setting	5,156 (188)	4,657 (282)	5,088 (284)	5,205 (303)	5,619 (255)
Primary care visits in ambulatory settings	4,605 (157)	4,185 (228)	4,539 (232)	4,591 (233)	5,055 (215)
Specialist visits in any setting	9,827 (403)	10,325 (550)	9,788 (514)	9,502 (501)	9,723 (484)
Specialist visits in ambulatory settings	8,917 (372)	9,408 (507)	8,786 (433)	8,531 (430)	8,968 (445)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	15 (1)	5 (1)	5 (1)	5 (1)	4 (1)
Percentage with an outpatient ED visit[e]	20 (2)	7 (1)	7 (1)	6 (1)	9 (1)
Percentage with an observation stay[f]	4 (1)	1 (< 0.5)	0 (0)	1 (< 0.5)	1 (< 0.5)
Percentage with a 30-day readmission among all discharges	11 (3)	5 (5)	3 (3)	16 (7)	19 (7)
Percentage of participants with a readmission among all participants	2 (1)	0 (0)	0 (0)	1 (< 0.5)	1 (< 0.5)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

These results suggest that the University of California at San Diego did not recruit a particularly high-cost patient population. However, the HSF-Z eligibility criteria focus on identifying people at risk of high future health care costs, not people whose current utilization is high. The likelihood of a 30-day all-cause hospital readmission among those hospitalized during the baseline year was 11 percent, well below the national average for Medicare FFS beneficiaries (18 percent), although this rate rose rapidly during the latter two quarters of the baseline year. Only a small share of both primary care and specialist visits (11 percent and 9 percent, respectively) were provided outside of ambulatory care settings, reflecting relatively low hospitalization rates in the program population.

The average PBPM expenditure fell from $860 in the first quarter of the baseline year to $709 in the quarter immediately preceding enrollment, which appears to be largely driven by a decline in inpatient stays. Although we will want to investigate this pattern further, it could be an artifact of the manner in which eligible individuals were identified and ultimately recruited. Participating physician practices were required to query their electronic medical records (EMRs) before the intervention started, roughly in 2014, to identify likely eligible patients. As a result, there could be some regression to the mean over the period from when health status was assessed for eligibility and when patients were actually recruited. Recruitment started slowly and accelerated only in the latter part of 2015. In addition, physician practices were able to prioritize certain patients for recruitment based on their risk level and other factors. Hence, the trends we observed could also be an artifact of heterogeneity in the enrolled population over time.

To better characterize the cardiovascular risk of beneficiaries in the treatment group, we measured the prevalence of chronic conditions associated with an elevated risk for major cardiovascular events that beneficiaries had in calendar year 2014 (Table 4). We used the Chronic Care Warehouse (CCW) condition flags to identify beneficiaries who were ever diagnosed with each condition. Those without the full 12 months of Medicare eligibility in 2014 were excluded from these comparisons. Rates remained unchanged from the previous quarter. Compared with all Medicare beneficiaries in 2014, beneficiaries in the treatment group were more likely to have diabetes (38 percent versus 27 percent), hyperlipidemia (54 percent versus 45 percent), ischemic heart disease (31 percent versus 27 percent), and hypertension (62 percent versus 55 percent).[5] However, the incidence of atrial fibrillation, heart failure, or prior stroke or transient ischemic attack was similar to national averages.

[5] National chronic condition prevalence rates from the Centers for Medicare and Medicaid Services may be found at https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/CC_Main.html.

Table 4. Prevalence of related chronic conditions in 2014 among beneficiaries in the treatment group

Percentage of Medicare beneficiaries with	Treatment group	All beneficiaries
Acute myocardial infarction	1	--
Atrial fibrillation	7	8
Diabetes	38	27
Heart failure (congestive heart failure)	12	14
Hyperlipidemia	54	45
Hypertension	62	55
Ischemic heart disease	31	27
Stroke or transient ischemic attack	3	4
Number of observations	653	

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The data in this table are based on 2014 CCW "ever had" condition flags and may not precisely replicate the clinical definitions used by UCSD's partner practices to identify patients with specific chronic conditions. The sample excludes anyone in the treatment group who was not a Medicare FFS beneficiary for all 12 months of 2014.

CCW = Chronic Conditions Warehouse; FFS = fee-for-service

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: University of California at San Diego

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	999
Projected Medicaid population with 6 months of program exposure	214
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,816
Likelihood of all-cause hospitalizations	4,154
MDE sample size requirement to detect 20% effect	
Total expenditures	704
Likelihood of all-cause hospitalizations	1,039
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Questionable, effects may not be observed in follow-up period
Claims sufficient to identify intervention and comparable comparison group?	Questionable, no testing yet to determine strength of intent-to-treat framework
Likelihood of solid comparison group	Serious concern; we may be not able to identify a strong comparison group
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Lack of strong comparison group
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Clinical data related to risk score assessment over time

We do not anticipate being able to construct a valid comparison group for the awardee. Therefore, we are unable to conduct a rigorous impact evaluation. The treatment beneficiaries are identified by using clinical data that are not available in claims data. We have received clinical information that is provided by clinicians and used to generate baseline and follow-up cardiovascular risk scores for stroke and acute myocardial infarction. We are evaluating the completeness of these data for use in an analysis of whether the awardee's program resulted in a change over time in cardiovascular risk. We will also report on the experiences of staff and participants, based on our surveys.

V. NEXT STEPS

A. Implementation evaluation

As the University of California at San Diego enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We continue to have serious concerns about the viability of the originally proposed difference-in-differences evaluation methodology for this awardee. We are unlikely to be able to identify a good comparison group because clinical variables that are not available in claims data are used to define the treatment group. Moreover, slow enrollment and delays in obtaining Medicaid claims data will severely limit the average amount of time that patients would be exposed to the HSF-Z intervention. Because strokes and heart attacks are relatively rare events, even among high-risk patients, the shorter exposure that patients will have to the intervention raises serious questions about whether sufficient statistical power will be achieved. As a result, we will explore alternative evaluation designs that rely more on HSF-Z programmatic data and assess the quality of these data

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include health coaches and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.30.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA AT SAN FRANCISCO

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MATHEMATICA Policy Research

REPORT

APPENDIX B.30

HCIA Round Two Evaluation: The Regents of the University of California at San Francisco

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Dementia Care Ecosystem program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress of the Regents of the University of California at San Francisco in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of California at San Francisco made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the University of California at San Francisco addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics for the treatment and control groups of University of California at San Francisco's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the Dementia Care Ecosystem program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment and control groups of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of California at San Francisco has used funding from HCIA R2 to create the Dementia Care Ecosystem program. Key program characteristics are shown in Table 1. The purpose of the program is to (1) improve patient and family satisfaction with dementia care, (2) reduce caregiver burden, (3) prevent emergency-related health care costs, and (4) keep patients in the community longer. The program is a joint partnership between the University of California at San Francisco and the University of Nebraska Medical Center. Since the program launched on March 31, 2015, each site has enrolled a diverse sample of participants with mild to advanced dementia in California, Nebraska, and Iowa.

The target population consists of Medicare or Medicaid beneficiaries age 45 and older with dementia at any stage (mild, moderate, or advanced), regardless of dementia type. Program staff also identify a primary family caregiver, who is required to be involved in the intervention. Permanent residents of nursing homes are excluded from participating. Participants are recruited from a variety of sources. The majority of participants have been recruited through either self-referral or the health systems of the University of California at San Francisco and the University of Nebraska Medical Center. Following enrollment, dyads are randomized to a treatment or control group. Members of the control group receive care as usual and are connected to community resources by a research coordinator (RC), who speaks with them over the phone.

The main component of the Dementia Care Ecosystem program is a care team navigator (CTN), who provides care management and caregiver support by telephone and who links participants with any needed community resources. Caregivers also have access to educational resources for legal, financial, and medical planning, as well as dementia care delivery from the CTN. The multidisciplinary Dementia Care Ecosystem clinical team—consisting of a nurse, a pharmacist, and a social worker—intervenes when participants need specialized attention or guidance for medical decision making. In addition, all participants receive a medication review by the team pharmacist at enrollment. Medication reviews can also be triggered at the request of a clinician or a CTN or by an automated alert from the computerized dashboard system that is used by program staff.

Program leaders originally planned to recruit 2,100 participant dyads (1,400 for the treatment group and 700 for the control group) by the end of the three-year cooperative agreement. In April 2016, due to slower-than-expected recruitment, they lowered their projections to 1,050 participant dyads (700 for the treatment group and 350 for the control group). At the end of the project period, they aim to have reduced the cost of dementia care by (1) delaying admission to long-term care facilities by 180 days, (2) lowering emergency department (ED) admissions by 50 percent, (3) preventing 30 percent of hospital costs, (4) diminishing ambulance costs by 30 percent, and (5) cutting the costs of prescription drugs by 15 percent. The University of California at San Francisco also aims to (1) improve participant satisfaction with care, (2) reduce caregiver stress, (3) increase advance decision making, (4) protect patient finances and safety, (5) improve medication management, and (6) respond efficiently and effectively to acute issues facing patients and caregivers.

The University of California at San Francisco is proposing two related payment models, which it is working on simultaneously. The awardee first hopes to implement a bundled payment

option within the existing fee-for-service (FFS) Medicare system, then eventually transition to a value-based purchasing model. In the second program year, the awardee continued to move forward in developing these payment models.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the University of California at San Francisco during the first year of its cooperative agreement.

- The flexibility of the program design and the collaborative nature of the awardee team supported the achievement of program goals. There was a high level of collaboration between care team members both within and between the implementing sites. Staff also described the program as being "agile." As a result, they were able to overcome several challenges, improve workflows, and move closer to program goals.
- Training and regular care team debriefings provided the CTNs with the resources to establish trust with participants and to identify their most important needs. The CTNs received extensive and ongoing training in various areas (including motivational interviewing) to help them interact with participants. At the same time, the team debriefings provided an opportunity to discuss challenging cases or issues and for the Dementia Care Ecosystem clinical team to provide guidance and feedback to the CTNs.

We also identified several initial challenges in implementing the program and the University of California at San Francisco's strategies for addressing them.

- Recruitment was more difficult than anticipated. Some initial recruitment strategies that program leaders thought might yield many referrals produced only very modest results. Staff therefore began to use other strategies, including maximizing media coverage and outreach at local health and wellness events. Program staff were also surprised at how time-consuming recruitment efforts were, so program leaders hired additional staff to deal with this issue.
- Engaging primary care providers outside of the University of California at San Francisco and the University of Nebraska Medical Center networks was challenging. Providers outside the hospital systems were less aware of the program. In addition, even when outside providers had patients who were enrolled in the program, the staff found it difficult to engage them. The staff attempted to contact providers in many ways—such as by fax, email, and phone—in an effort to customize the most efficient route to each provider. Program leaders also directly contacted some providers.

Finally, we identified the following early lesson learned by the University of California at San Francisco in implementing its program.

- Recruitment efforts that program leaders thought would yield many referrals were unsuccessful, so program leaders realized that it was important to have several different strategies in place.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of California at San Francisco made progress in the following areas:

- Program staff noted that outreach efforts made during program Year 1 began to pay off and recruitment picked up in the second year. For the University of Nebraska Medical Center, outreach efforts included a large media campaign. For the University of California at San Francisco, outreach included tailoring community outreach to the populations that the awardee was trying to recruit.
- The University of California at San Francisco continued to individualize the intervention depending upon the needs of participants. For example, program staff determined the best times to reach participants and the optimal frequency for follow-up calls based on the individual needs of the caregivers and patients. In addition, the awardee was working to make the implementation of participant follow-up surveys more efficient.
- Program leaders continued to prioritize RC and CTN trainings. For example, leaders added multiple self-care trainings to help staff members cope with the stress and emotional strain they may experience as part of their jobs.
- Program leaders revised and finalized program modules and resources. Staff completed the final version of the dementia care curriculum, an education and resource binder. In addition, staff completed the financial assessment piece of the decision-making module and modified the pharmacy module to better assist caregivers with engaging in conversations with providers regarding the patient's medication list. The functional monitoring pilot also began in the second year; program staff were recruiting 10 to 12 participants to begin testing the tool in September 2016.
- The University of California at San Francisco has renewed its efforts to have both bundled payment and value-based purchasing payment models. The awardee's focus in Year 2 was engaging potential payers.

Over the past year, the University of California at San Francisco also made several changes to its program:

- Program leaders hired an operational director and a full-time social worker. The University of California at San Francisco and the University of Nebraska Medical Center also hired additional RCs to assist with recruitment activities as well as additional CTNs. Staffing of the program is now complete.

Below we note the key challenges that the University of California at San Francisco has worked to address in the second year of its cooperative agreement.

- The awardee continued to struggle with recruitment of minority populations. The University of California at San Francisco and the University of Nebraska Medical Center hired bilingual staff and tailored outreach activities to better reach minority and Spanish-speaking populations.

- The University of California at San Francisco and the University of Nebraska Medical Center continued to face challenges in engaging external providers to help with recruitment of eligible participants into the program. Both program teams continue to reach out to providers with varying levels of success. In addition, they have taken other approaches such as reaching out to payers to help with recruitment and sustainability activities.

As the University of California at San Francisco enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Several organizations have expressed interest in the program, but they want to see whether the program generates cost savings before partnering with the University of California at San Francisco. Although the awardee does not believe it will be a challenge to eventually show cost savings outcomes, it may not be able to do so before the end of the cooperative agreement.

Table 1. The University of California at San Francisco: Dementia Care Ecosystem characteristics at a glance

Program characteristic	Description
Purpose	The goals of the program are to improve patient quality of life, improve caregiver satisfaction with dementia care, reduce the total costs of care, delay nursing home placement, and reduce caregiver burden.
Components	• **Patient navigator or health coach.** Via telephone, CTNs will oversee care, link participants with resources, and triage questions about medical decision making to appropriate professionals. • **Care coordination.** The clinical team will train, supervise, and provide expert advice to CTNs, and intervene when specialized attention or guidance for medical decision making is needed. Clinical teams consist of a nurse, a pharmacist, and a social worker. • **Medication management and adherence.** Through a computerized dashboard system, all participants receive a medication review by a pharmacist at enrollment. Medication reviews can also be triggered at the request of a clinician or a CTN or by an automated alert from the dashboard monitoring system. • **Patient and family education.** Education and support resources are targeted to the patient's needs and stage of dementia. Resources include legal, financial, and medical planning, as well as behavior management and safety planning for caregivers. • **Health information technology.** The dashboard clinical workflow management tool consists of (1) a caregiver module, (2) a medication module, (3) a decision-making module, and (4) functional monitoring (in design phase). The dashboard also includes scheduling and data collection tools. A caregiver portal is being developed.
Target population	• Medicare or Medicaid beneficiaries age 45 and older with a diagnosis of dementia and their caregivers, including underserved populations
Theory of change/theory of action	The University of California at San Francisco (UCSF) hypothesizes that giving patients and caregivers personalized preventive care that is provided over the phone and supported by innovative technology should reduce the incidence of medical emergencies, prevent unnecessary ED and hospital use, and delay nursing home placement. UCSF believes these outcomes should result in overall cost savings to health care systems and improved quality of life for patients and families.

Table 1 *(continued)*

Program characteristic	Description
Payment model	New fee-for-service (FFS) payment, value-based payments, bundled or episode payment, capitated payment for care management/coordination services
Award amount	$9,990,848
Launch date[a]	3/31/2015
Setting	• By telephone (Calls usually take place in the participants' home but sometimes in other settings, such as during a caregiver's lunch break from work.)
Market area	• Rural, urban, and suburban
Market location	CA, IA, NE
Outcomes	• Improved caregiver perception of patient's quality of life • Heightened caregiver satisfaction with module services • Reduced caregiver burden • Reduced caregiver depression • Decreased (1) ED visit rate and costs, (2) hospitalization costs, (3) ambulance utilization and costs, (4) nursing facility costs, (5) prescription drug costs, (6) use of high-risk medications and other potentially inappropriate medications, and (7) percentage of patients with an adverse drug event

[a]After the initial planning period, the awardee's program began to operate as of this date.

CTN = care team navigator; ED = emergency department

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of California at San Francisco in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 15 through July 26, 2016. For the analyses of the University of California at San Francisco's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Awardee leaders at the University of California at San Francisco and the University of Nebraska Medical Center
- CTNs and RCs at both health systems
- Clinical social workers at both health systems
- Dementia Care Ecosystem technical director and IT staff

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

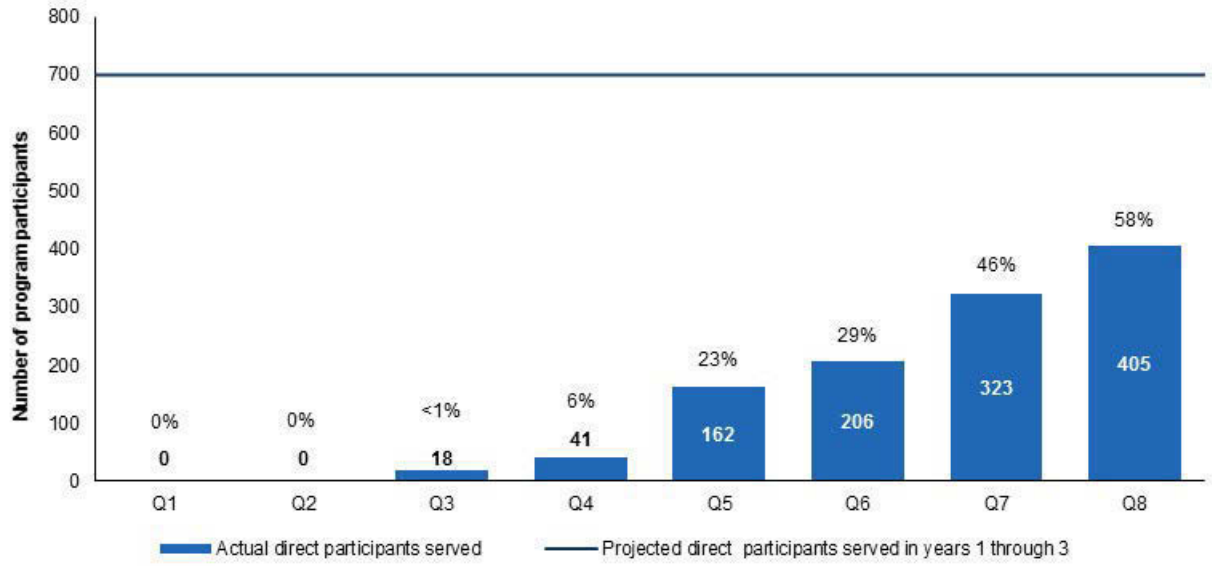
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the University of California at San Francisco's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, the University of California at San Francisco reported to the implementation and monitoring contractor that it directly served 405 participants from March 2015 (the launch of its program) through August 2016, which represents about 58 percent of its 700 revised projected direct participants for the treatment group (Figure 1). The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, first through eighth program quarters (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. UCSF does not have indirect program participants.

Program staff discussed their continual efforts to engage providers and take advantage of connections in the community in order to help recruit eligible participants into the program. For example, the University of Nebraska Medical Center engaged several external partners to assist with recruitment. During Year 1 of the program, staff reported that lower-than-expected levels of enrollment were primarily due to area agencies on aging not providing as many referrals as expected. As a result, the University of Nebraska Medical Center began to branch out to other providers in Year 2—although, some of these providers have also yielded fewer-than-expected referrals. For example, a private senior care franchise teamed up with the University of Nebraska Medical Center to help recruit participants by sending out the program brochure to over 600 of their customers in Iowa and Nebraska. Unfortunately, the program only received one response and that individual was not eligible for the program. University of Nebraska Medical Center staff believe that the low response rate may have been associated with how the brochure was distributed. Because the program brochure was sent as part of customer billing, potential

participants might have been less receptive to learning about the program. University of Nebraska Medical Center is also partnering with Blue Cross Blue Shield (BCBS) to help with recruitment. BCBS will publicize the program on its website and through mailers to potentially eligible clients.

The University of California at San Francisco also reported that many external providers for privacy reasons do not want to provide patient contact information to the program staff, who are responsible for contacting potential participants about the project. In these cases, the providers are responsible for giving the project details to their patients—which may or may not happen depending upon how busy they are or how much of a burden it is for them. Program staff planned to continue reaching out to providers, but providers are not always receptive.

Program staff reported that they had put a lot of effort into community outreach events for the general population during Year 1 and that it had begun to pay off. For example, University of Nebraska Medical Center staff stated that they developed a media campaign that increased potential participants' awareness of the program and resulted in a significant number of self-referrals. During the first program year, the University of Nebraska Medical Center staff also reached out to organizers of community events and dementia support groups to find out if they could make presentations at events. They reported that now that the program has become well-known they are fielding calls from these same types of entities to come and present to the groups. One program leader commented, "I would say at least once a week I get an email or phone call request asking for us to come and talk about the [program], which is great." The University of California at San Francisco has found that reaching out to community agencies at least monthly serves as a helpful reminder about the program.

In addition, the University of California at San Francisco and the University of Nebraska Medical Center have tried to tailor their outreach to specific minority populations. For example, the University of California at San Francisco has hired RCs who speak Cantonese and Spanish to help reach those communities. Program staff are also working to make more face-to-face connections with eligible participants. They have found personal contact to be effective in getting both the Latino and Cantonese populations more engaged. The University of Nebraska Medical Center also hired a Spanish-speaking RC and CTN, which improved outreach to that community. However, this site reported continuing struggles to recruit members of other minority populations (particularly African Americans) as well as Iowa residents. Program leaders at the site are working to develop strategies to improve enrollment for those groups.

B. Implementation of the service delivery model

Although the University of California at San Francisco has continued to face several challenges, it has also continued to make progress in implementing its service delivery model. Program staff continue to work towards personalizing the intervention to meet the individual needs of each participant, while program leaders are providing support and training for CTNs and RCs to help them in their roles. In addition, all program modules have been launched and are progressing as planned. The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

> "It's just so exciting to be part of an agile trial where we have the opportunity [to personalize and individualize the intervention as needed]. We've been analyzing data that we're collecting . . . and thinking about how we can really make sure our program is as optimal as possible."
>
> *— Program leader*

The University of California at San Francisco and its implementation partner indicated that the intervention's flexibility allows them to individualize it for caregivers and patients based on factors such as caregiver needs, level of knowledge about dementia, and patient disease stage. For example, CTNs at both sites agreed that they tailor how often they call caregivers. Some caregivers who have been providing care for several years have stated that they prefer not to receive frequent follow-up calls but appreciate knowing that there is someone they can call if needed. Similarly, program leaders have re-evaluated how often participants receive follow-up surveys in order to avoid overburdening them with too many calls. Currently, a given participant might receive regular follow-up calls from the CTN in addition to calls from the RCs to complete three-month, nine-month, and annual surveys. Program leaders are considering consolidating the number of follow-up surveys so that participants do not have to field as many calls. In addition, CTNs can stop contacting a caregiver for a period of time and check in with them again at a later date if they perceive that the caregiver is feeling overwhelmed by the outreach.

2. Implementation processes

Program staff use a clinical workflow management application (the dashboard) to support patient navigation, medication management, and other Dementia Care Ecosystem activities. The dashboard also includes scheduling and data collection tools. Staff reported that there has been less of a focus on development and optimization of the dashboard system in Year 2 compared to Year 1. One staff member stated, "We're finally in a place where we're really engaging in delivering care and the [technology] is doing what it's supposed to do." The dashboard has now become a standard way for the CTNs and other staff to document care.

During Year 2, program staff developed new resources and refined their strategies to better serve participants. For example, the program team completed the final version of the dementia curriculum, which is a library of curated educational materials for CTNs to share with participants based on their needs. The CTNs have also begun to offer the decision-making module to caregivers and patients. This module is intended to facilitate proactive medical,

financial, and safety decision-making for patients and caregivers. Since spring 2016, the program staff have provided a review of available resources, which gauges the long-term care planning needs of the patient-caregiver dyad. The Dementia Care Ecosystem includes general legal guidance on addressing difficult cases. The team refers participants to a medical-legal partnership in Nebraska and Iowa and to a state bar–approved Elder Law Referral Service in California. Program leaders stated that the rollout of this module has been a major milestone. Due to the complex issues it addresses, the module has been a challenge to deploy and implement correctly.

> "I think a major milestone we have hit is we have been able to deliver on the promise of improved medication safety to our subjects."
>
> *— Program leader*

The program team also made progress in implementing the pharmacy module. Dementia Care Ecosystem pharmacists review patients' medications and screen for medication-related problems, such as adverse drug events and patient nonadherence. The team continues to focus on working with the caregiver rather than the provider. Staff have added a packet that is sent to the caregiver, which includes a list of medications the patient is on; medication recommendations from the pharmacist; and educational information (for example, about potential side effects of medications). The CTNs also talk to the caregivers about bringing the medication list to the patient's primary care provider appointments. Program leaders stated that the majority of the time primary care providers are willing to work with the program pharmacist's recommendations to help reduce harmful or unnecessary drugs.

The pilot of the functional monitoring component began in the second program year. This module involves the use of smartphones and smartwatches worn by the person with dementia to rapidly detect and respond to changes in functional status. The awardee began enrolling participants in the pilot in September 2016 to evaluate the validity and efficacy of the data in order to decide if the component should continue.

Staff continued to identify the best approaches for engaging participants in both the treatment and control groups. The program team has begun mailing birthday cards to participants in both groups. Staff have received positive feedback on this. Finally, the team received institutional review board approval to provide $25 gift cards for completion of the 6-month and 12-month follow-up surveys. Participants in the study have been responsive to the survey incentives.

The Dementia Care Ecosystem program has benefitted from increased staffing. Both sites hired new staff in the second program year and are now fully staffed for the program. In addition to increased RC staffing, the University of California at San Francisco now has nine CTNs (four of whom were hired in the last year) and the University of Nebraska Medical Center has five CTNs (two of whom were hired in the last year). The increased staffing has helped the program meet its recruitment challenges because the existing RCs are no longer overloaded with cases. A new operational director was also hired in the past year to help oversee recruitment efforts, among other responsibilities such as managing staff. Program staff stated that this additional support has made a significant difference at both sites.

Program leaders continue to provide support and training for CTNs and RCs, including trainings on motivational interviewing and communicating with caregivers. In addition, they also started to provide monthly workshops and activities for CTNs on self-care, such as dealing with stress. Workshops have included talks and sessions provided by a chaplain, a dance therapist, and psychologists from the employee assistance program. Program leaders stated that they did not initially anticipate the need for this additional support, but they found that the CTNs' work could be emotionally stressful. For instance, CTNs constantly hear about the serious problems that many caregivers encounter, while sometimes feeling powerless to "fix" anything.

3. Organizational and external context

The University of California at San Francisco identified a lack of community and internal resources for non-English speakers as a challenge to implementing the program. Staff continue to identify strategies to best support these participants but the bilingual program staff hired in the past year have encountered unique challenges in implementing the program. The bilingual CTNs and RCs do not have access to supervisors or clinical support staff who are also bilingual. In many cases, clinicians or social workers on the Dementia Care Ecosystem team will support CTNs and RCs by having direct care conversations with participants if needed. However, this is not an option for the bilingual staff. In addition, program staff at the University of California at San Francisco found that Cantonese-speaking participants were relying on the CTNs for service needs outside the scope of the program. In such cases, the CTN and social worker try to link the participant to outside services that are better equipped to handle these needs. Nonetheless, this has been an unanticipated challenge for staff.

Program leaders reported that making external connections with other HCIA R2 awardees that are also focused on dementia has been beneficial. One program leader stated that one of the accomplishments of the effort is forging professional connections with educators and clinicians doing similar work across the country.

C. Development of the payment model

The University of California at San Francisco continues to move forward with two proposed payment models: (1) working within the current FFS payment model and (2) developing a shared value, accountable care organization (ACO), capitated model. Although the awardee is developing two related payment models at the same time, its plan is to first launch the FFS chronic care management reimbursement codes within the current Medicare system and then eventually move toward the proposed value-based purchasing payment model within Medicare. The awardee believes that the shift toward shared savings is how the health care system as a whole is evolving. The awardee's focus during Year 2 has been on demonstrating cost savings and engaging with external partners.

In order to discuss the effectiveness of the payment models with payers, the University of California at San Francisco is analyzing Medicare data to understand the cost of dementia care in California, Nebraska, and Iowa by geographic area (that is, rural versus urban) and by type of dementia. The awardee aims to identify any patient savings for Medicare. In order to do that, the awardee is comparing outcomes for Medicare beneficiaries enrolled in the program with those of other dementia beneficiaries as well as non-dementia beneficiaries. Some preliminary data has suggested that participants in the program are already low-cost patients and, thus, generating

savings from the program may be difficult. The awardee believes this might be due to the fact that the patients currently enrolled in the program might be better diagnosed and receiving optimal treatment. The team is working to continue to enroll more of a mix of participants that would better reflect Medicare's population.

The University of California at San Francisco is trying to show that the program could be initially supported by organizations using a new, combined "chronic care management code," which the awardee will create once it can demonstrate that the program provides savings. Program leaders reiterated that the current payment per beneficiary per month for the existing chronic care management (CCM) is too low; however, enhanced reimbursement rates in CCM codes in the Medicare 2017 Physician Fee Schedule are promising. They are working to provide evidence about the real cost of treating patients with different types of dementia through their program. The University of California at San Francisco hopes to partner with physician and payment groups by either contracting with providers to provide the program services or allowing providers to deliver the services directly and bill using the chronic care management code.

The University of California at San Francisco is also continuing to work toward its second proposed payment model. In order to develop a value-based purchasing payment model, the awardee is engaging external partners such as ACOs and other organizations to get them on board with the program and with demonstrating a shared savings payment model. For example, the awardee believes that lessons learned from the program might be appealing to large managed care groups that already have shared savings payment models. Program leaders stated that these organizations have their own infrastructure for providing programs but do not always have the knowledge, expertise, or specific information needed to create the programs. These organizations have expressed interest in working with the awardee to set up their own ecosystem programs. The University of California at San Francisco and the University of Nebraska Medical Center have had preliminary conversations with payer organizations. They hope to continue these activities in the next year.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents our summary of the baseline characteristics of the treatment group, which we measured during the 12 months before each beneficiary's enrollment date and entry into the Dementia Care Ecosystem program. The majority of participants have been recruited through self-referral or physician referral to the health systems of the University of California at San Francisco or the University of Nebraska Medical Center. The treatment group for this evaluation consists of Medicare beneficiaries who were randomized to the Dementia Care Ecosystem program.

A. Baseline characteristics of the treatment group

The University of California at San Francisco and the University of Nebraska Medical Center began to enroll Medicare and Medicaid beneficiaries into the Dementia Care Ecosystem program in March 2015. After enrollment, participants are randomized 2:1 to either the Dementia Care Ecosystem treatment group or to the usual care control group, in which participants complete surveys only. The start date of the intervention is defined as the date of randomization. As of May 31, 2016, the awardee had enrolled 519 unique beneficiaries into the program. The Medicaid sample is not expected to be large enough to detect an impact on key outcomes, though we will monitor enrollment and consider including Medicaid beneficiaries in the impact evaluation if feasible.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each enrollee and therefore varies by participant. After we excluded beneficiaries who did not meet the above criteria, a total of 363 participants were included in the analysis of baseline characteristics for this report, with 235 in the treatment group and 128 in the randomized control group.

The Medicare FFS beneficiaries participating in the Dementia Care Ecosystem program are elderly and primarily white (Table 2). The majority of participants in the treatment group are age 75 or older—40 percent are 75 to 84 years old, and 27 percent are 85 or older. Only 3 percent of participants are younger than 65. Most participants are female (58 percent) and white (88 percent). The original reason for Medicare eligibility was primarily age or survivor's insurance (92 percent). None of the participants was entitled to Medicare because of end-stage renal disease (ESRD). Compared with 24 percent of Medicare beneficiaries nationwide, only 8 percent of participants were originally eligible for Medicare because of a disability. Nine percent of participants are dually eligible for Medicare and Medicaid, compared with 18 percent nationally, although in some cases, Medicaid benefits may be restricted to the payment of co-insurance and deductibles. The average hierarchical condition categories (HCC) risk score of participants is 1.33, which means that beneficiaries recruited for the Dementia Care Ecosystem program are predicted to be 33 percent more costly than the general Medicare FFS population in the first year of the program.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the treatment group of the awardee's program through May 31, 2016

	All participants (N = 235)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	7	3
65 to 74	69	29
75 to 84	95	40
85 and older	64	27
Gender		
Female	137	58
Male	98	42
Race		
White	206	88
Black	11	5
American Indian, Alaska Native, Asian/Pacific Island American, or other	13	6
Hispanic	2	0.85
Original reason for Medicare eligibility		
Old age and survivor's insurance	216	92
Disability insurance benefits	19	8
ESRD[a]		
Hospice[b]	3	1
Medicare/Medicaid dual status, percentage dual[b]	22	9
HCC score[c]		Statistic
Mean		1.33
25th percentile		0.68
Median		1.13
75th percentile		1.68

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary was randomized to the treatment group or to the control group. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

Table 3 shows baseline utilization and expenditure data for the treatment group on a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation. The awardee aims to lower the total cost of care by reducing emergency department (ED) visits; hospital admissions; and other health services such as ambulance use, nursing home care, and high-risk, potentially inappropriate medications. We examined baseline cost of care by calculating average per beneficiary per month (PBPM)[3] Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $1,078, compared with national mean Medicare spending of $864 PBPM.[4] The quarterly PBPM ranged from $956 to $1,217. The average PBPM Medicare payments for inpatient ($231) and physician services ($258) were the largest drivers of the total cost of care. Quarterly expenditures for inpatient services ranged from $200 to $260 PBPM and from $233 to $295 PBPM for physician services.

The rate of acute care hospitalizations was 293 per 1,000 Medicare FFS participants per year during the baseline year, with 23 percent of participants having at least one hospitalization during the 365 days before enrollment. The rate of ED visits was 490 per 1,000 participants per year in the baseline year, compared with the national rate of 652 per 1,000 Medicare beneficiaries annually—with the rate nearly doubling in quarters 3 and 4 compared with the first two quarters.[5] The rate of ambulatory observation bed stays was 82 per 1,000 beneficiaries per year in the baseline year. Overall, observation stays at baseline were higher than the national average of 58 per 1,000 beneficiaries per year in 2014.[6]

In the baseline year, the rate of primary care visits was substantially lower than the rate of specialty services in ambulatory settings (4,832 per 1,000 Medicare FFS participants per year compared with 8,270 per 1,000 participants per year, respectively). Given that the program targets a specialty population, the higher rates of specialty care may be expected. Twelve percent of all hospital discharges were followed by a readmission in the 30-day post-discharge window in the baseline year. The percentage of hospital discharges with a 30-day readmission was lower than the national average for Medicare beneficiaries (18 percent).

[3] The months referred to in our calculations are 30-day periods rather than calendar months.

[4] The Kaiser Family Foundation, Medicare Spending per Enrollee, by State. Available at http://kff.org/medicare/state-indicator/per-enrollee-spending-by-residence/. Accessed October 25, 2016.

[5] See the Centers for Medicare & Medicaid Services. "Public Use File; New Data on Geographic Variation." Available at http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed May 2016.

[6] See the Medicare Payment Advisory Commission. "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf. Accessed August 2016.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the treatment group of the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	235	231	233	235	235
Average Medicare expenditures PBPM[a]					
Total	1,078 (103)	1,217 (211)	956 (145)	1,103 (158)	1,038 (167)
Acute inpatient	231 (38)	233 (69)	200 (63)	260 (88)	229 (78)
Inpatient other[b]	28 (17)	85 (61)	29 (29)	0 (0)	0 (0)
Outpatient[c]	221 (37)	252 (77)	224 (60)	177 (33)	231 (59)
Physician services	258 (23)	259 (28)	246 (31)	295 (44)	233 (22)
Home health	128 (21)	123 (33)	98 (28)	157 (36)	135 (29)
Skilled nursing facility	94 (26)	127 (52)	52 (26)	110 (59)	86 (53)
Hospice	88 (43)	129 (59)	75 (45)	67 (43)	84 (46)
Durable medical equipment	30 (17)	11 (2)	34 (23)	37 (23)	40 (23)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	293 (39)	315 (83)	224 (65)	325 (86)	306 (81)
Outpatient ED visits	490 (58)	472 (95)	292 (73)	565 (119)	630 (120)
Observation stays	82 (19)	105 (42)	86 (38)	69 (34)	68 (34)
Primary care visits in any setting	5,623 (338)	6,087 (585)	4,886 (416)	5,824 (496)	5,702 (430)
Measures of any health care utilization					
Percentage with a hospital admission[d]	23 (3)	7 (2)	5 (1)	7 (2)	6 (2)
Percentage with an outpatient ED visit[e]	32 (3)	10 (2)	7 (2)	11 (2)	13 (2)
Percentage with an observation stay[f]	8 (2)	3 (1)	2 (1)	2 (1)	2 (1)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Percentage with a 30-day readmission among all discharges	12 (4)	13 (9)	0 (0)	11 (8)	19 (9)
Percentage of participants with a readmission among all participants	3 (1)	1 (1)	0 (0)	1 (1)	1 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Identifying a comparison group and evaluating the awardee-collected measures

As mentioned, participants are randomized in a 2:1 ratio of treatment to control groups. In general, the groups are similar with respect to demographic characteristics; absolute differences range from zero for HCC scores to 7 percentage points for ages 65 to 74 (Table 4). Similarly, we did not find statistically significant differences in expenditures. We note that the outpatient ED visit rate was significantly higher in the treatment group than in the control group (the absolute difference was -245 per 1000 [SE 107], $p = 0.02$). The largest difference we observed was for baseline specialist utilization; in the treatment group, there were more specialist visits in any setting as well as in ambulatory settings (an absolute difference of 524 per 1000 [SE 886] and 591[SE 762], respectively), though this is not statistically significant. We will explore with the awardee why these differences may exist, but we will also monitor whether these differences diminish as enrollment increases.

Table 4. Baseline comparison of awardees' treatment group to randomized control group for Medicare FFS beneficiaries enrolled through May 31, 2016

Types of expenditures and utilization measures	Randomized control (N = 128)	Treatment (N = 235)	Absolute difference	*P*-value
Total number of enrollees	128	235	107	
Age as of enrollment date				0.32
Younger than 65 (%)	5	3	2	
65 to 74 (%)	36	29	7	
75 to 84 (%)	34	40	-6	
85 and older (%)	24	27	-3	
Gender				0.51
Female (%)	55	58	-3	
Male (%)	45	42	3	
Race				0.58
White (%)	90	88	2	
Black (%)	2	5	-3	
American Indian, Alaska Native, Asian/Pacific Island American, or other (%)	5	6	-1	
Hispanic (%)	2	0.85	1	
Original reason for Medicare eligibility				0.37
Old age and survivor's insurance (%)	89	92	-3	
Disability insurance benefits (%)	11	8	3	
ESRD[a] (%)				
Hospice (%)	2	1	1	0.45
Medicare/Medicaid dual status, percentage dual[b] (%)	8	9	-1	0.62
HCC score[c]				0.99952
Mean	1.33	1.33	0	
25th percentile	0.54	0.68	-0.14	
Median	1.01	1.13	-0.12	
75th percentile	1.67	1.68	-0.01	
Average Medicare expenditures PBPM[d]				
Total	1,050 (188)	1,078 (103)	28 (196)	0.89
Acute inpatient	312 (112)	231 (38)	-82 (97)	0.40
Inpatient other[e]	4 (4)	28 (17)	24 (23)	0.30
Outpatient[f]	158 (28)	221 (37)	62 (54)	0.25

Table 4 *(continued)*

Types of expenditures and utilization measures	Randomized control (N = 128)	Treatment (N = 235)	Absolute difference	*P*-value
Physician services	254 (43)	258 (23)	4 (44)	0.93
Home health	122 (30)	128 (21)	6 (36)	0.86
Skilled nursing facility	149 (54)	94 (26)	-55 (53)	0.30
Hospice	32 (19)	88 (43)	56 (60)	0.35
Durable medical equipment	18 (6)	30 (17)	13 (24)	0.60
Health care utilization rates (annualized per 1,000)				
Acute hospital admissions[g]	280 (64)	293 (39)	13 (71)	0.86
Outpatient ED visits	736 (99)	490 (58)	-245 (107)	0.02
Observation stays	88 (27)	82 (19)	-6 (33)	0.85
Primary care visits in any setting	5,814 (461)	5,623 (337)	-191 (570)	0.74
Primary care visits in ambulatory settings	5,118 (371)	4,832 (276)	-287 (462)	0.54
Specialist visits in any setting	9,045 (705)	9,596 (530)	524 (886)	0.55
Specialist visits in ambulatory settings	7,678 (593)	8,270 (461)	591 (762)	0.44
Acute hospital admissions[g]	188 (87)	306 (81)	119 (127)	0.4
Outpatient ED visits	719 (143)	630 (120)	-89 (194)	0.7
Average Medicare expenditures PBPM	890 (187)	1,038 (167)	148 (266)	0.6
Measures of any health care utilization				
Percentage with a hospital admission[g]	19 (3)	23 (3)	4 (5)	0.42
Percentage with an outpatient ED visit	41 (4)	32 (3)	-8 (5)	0.11
Percentage with an observation stay	8 (2)	8 (2)	0 (3)	0.93
Percentage with a 30-day readmission among all discharges	5 (4)	12 (4)	7 (6)	0.25
Percentage of participants with a readmission among all participants	2 (1)	3 (1)	1 (2)	0.41

Table 4 *(continued)*

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: For awardee's enrollees, the baseline year is the 365 days before each participant's enrollment date; for control cases, the baseline year is the same. We weight every outcome during the baseline year and pre-enrollment baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

[d]Total Medicare expenditures were calculated from all claims for each participant with at least one eligible day during the baseline year and quarter.

[e]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[f]Includes visits to ED and hospital outpatient department, as well as outpatient surgeries.

[g]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

ED = emergency department; ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition categories; PBPM = per beneficiary per month

The awardee administered surveys in the following areas to participant-caregiver dyads in the treatment and control groups: patient quality of life (Quality of Life–Alzheimer's Dementia [QOL-AD]), caregiver depression (Patient Health Questionnaire–9 [PHQ9]), burden (Zarit Burden Index [ZBI]), and self-efficacy. Mean baseline values for these measures are shown in Table 5.

Table 5. Baseline comparison of awardee-collected participant and caregiver measures for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Patient and caregiver measures	Randomized control (N = 128)	Treatment (N = 235)	Absolute difference	*P*-value
QOL-AD, participant[a] (n = 147)	38.6 (0.8)	38.8 (0.7)	0.2 (1.1)	0.84
QOL-AD, caregiver[a] (n = 362)	33.3 (0.5)	32.8 (0.4)	-0.5 (0.7)	0.41
PHQ9, caregiver[b] (n = 363)	4.1 (0.3)	4.6 (0.3)	0.6 (0.5)	0.22
ZBI, caregiver[c] (n = 363)	17.5 (0.8)	18.0 (0.6)	0.5 (0.9)	0.62
Caregiver rating of self-efficacy[d] (n = 363)	14.1 (0.2)	13.1 (0.2)	-0.9 (0.3)	0.01

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

[a]The QOL-AD, a 13-item survey, was administered to the participant and to the participant's caregiver. It assesses the participant's quality of life. Scores ranged from 13 to 52, and higher scores indicate a higher quality of life. The number of participants completing the questionnaire was less than the total number of participants because of cognitive impairment, inability to complete the survey, and participant refusals.

[b]PHQ9 is a 9-item survey assessing depression. Scores ranged from 0 to 27. Scores less than or equal to 9 indicate minimal to mild depression; scores greater than or equal to 10 indicate moderate to severe depression.[7]

There was no difference between the treatment and control groups in the mean QOL-AD scores at baseline. In the treatment group, we observed higher QOL-AD scores when participants with dementia completed the survey (mean of 38.8) than when caregivers assessed the participant's quality of life (mean of 32.8). Higher participant quality of life scores may reflect nonresponse bias. Over half the sample did not complete the survey because of cognitive impairment or refusal; patients with less severe cognitive impairment may have a higher quality of life. However, studies have suggested that caregivers tend to rate a dementia patient's quality of life lower than the patient would rate it.[8]

[7] Kroenke, Kurt, Robert L. Spitzer, and Janet B. W. Williams. "The PHQ-9." *Journal of General Internal Medicine,* vol. 16, no. 9, September 1, 2001, pp. 606–613. doi:10.1046/j.1525-1497.2001.016009606.x.

[8] Lacey, L., J. Bobula, K. Rüdell, J. Alvir, and C. Leibman. "Quality of Life and Utility Measurement in a Large Clinical Trial Sample of Patients with Mild to Moderate Alzheimer's Disease: Determinants and Level of Changes Observed." *Value in Health,* vol. 18, no. 5, July 2015, pp. 638–645. doi:10.1016/j.jval.2015.03.1787.

Caregiver depression, assessed by the mean PHQ9 score, was 4.1 for the control group and 4.6 for the treatment group at baseline, suggesting minimal to mild depression. There was no significant difference between the groups ($p = 0.22$), and baseline results are comparable to other studies of dementia caregivers.[9] Likewise, burden scores (ZBI scores of 17.5 and 18.0 for the control and treatment groups, respectively) are similar to findings in the dementia caregiver literature.[10] Scores above 17 suggest severe burden. There was a small but significant difference in the caregivers' rating of self-efficacy between the control and treatment groups (14.1 versus 13.1, $p = 0.01$). We have not observed major differences in participant baseline characteristics to explain this difference in caregiver self-efficacy.

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 6: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

[9] Jennings, Lee A., David B. Reuben, Leslie Chang Evertson, Katherine S. Serrano, Linda Ercoli, Joshua Grill, Joshua Chodosh, Zaldy Tan, and Neil S. Wenger. "Unmet Needs of Caregivers of Individuals Referred to a Dementia Care Program." *Journal of the American Geriatrics Society,* vol. 63, no. 2, February 1, 2015, pp. 282–289. doi:10.1111/jgs.13251.

Schubert, Cathy C., Malaz Boustani, Christopher M. Callahan, Anthony J. Perkins, Siu Hui, and Hugh C. Hendrie. "Acute Care Utilization by Dementia Caregivers Within Urban Primary Care Practices." *Journal of General Internal Medicine,* vol. 23, no. 11, August 9, 2008, pp. 1736–1740. doi:10.1007/s11606-008-0711-0.

[10] Nichols, Linda Olivia, Jennifer Martindale-Adams, Robert Burns, Marshall J. Graney, and Jeffrey Zuber. "Translation of a Dementia Caregiver Support Program in a Health Care System—REACH VA." *Archives of Internal Medicine,* vol. 171, no. 4, February 28, 2011, pp. 353–359. doi:10.1001/archinternmed.2010.548.

Werner, Perla, Mary S. Mittelman, Dovrat Goldstein, and Jeremia Heinik. "Family Stigma and Caregiver Burden in Alzheimer's Disease." *The Gerontologist,* vol. 52, no. 1, February 1, 2012, pp. 89–97. doi:10.1093/geront/gnr117.

Table 6. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: University of California at San Francisco

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	436
Projected Medicaid population with 6 months of program exposure	1
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,563
Likelihood of all-cause hospitalizations	2,454
MDE sample size requirement to detect 20% effect	
Total expenditures	391
Likelihood of all-cause hospitalizations	614
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Claims not needed
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff survey
Implementation data that will be analyzed	The awardee has provided data on the following for treatment and comparison groups: Patient Quality of Life–Alzheimer's Dementia measure, caregiver Patient Health Questionnaire–9, caregiver Zarit Burden Index, caregiver self-efficacy

DDB = difference-in-differences Bayesian

The awardee is conducting a randomized controlled trial, which allows us to use a multivariate regression-adjusted analysis to estimate program impacts. Medicare FFS claims data for both the treatment and the control group are available; the availability of Medicare managed care and Medicaid data is to be determined. Challenges for the evaluation include a significant number of Medicare Advantage patients and uncertainty about data availability for this population. We have sufficient projected participation by Medicare FFS beneficiaries to detect a 20 percent effect on Medicare expenditures.

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V. NEXT STEPS

A. Implementation evaluation

As the University of California at San Francisco enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will report impact estimates for the core outcomes if at least 300 Medicare FFS beneficiaries have been enrolled in the program for at least six months. We will also continue to evaluate awardee-collected data on participant quality of life and caregiver depression, burden, and self-efficacy.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering a survey of non-clinician staff affiliated with the program. The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include care team navigators, social workers and care team navigators. We expect to report the results of the survey in the third annual report in January 2018.

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APPENDIX B.31.

UNIVERSITY HOSPITALS CLEVELAND MEDICAL CENTER

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MATHEMATICA Policy Research

REPORT

APPENDIX B.31

HCIA Round Two Evaluation: University Hospitals Cleveland Medical Center

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of University Hospital Cleveland Medical Center's Learning Individual Needs and Coordinating Care (LINCC) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Cleveland Medical Center's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Cleveland Medical Center made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have Cleveland Medical Center and its community satellite clinics addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its clinics to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Cleveland Medical Center's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the LINCC program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to, and any findings from, our analysis of Medicare claims (Section IV)
- Next steps in our implementation and impact evaluations, including the staff survey (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Cleveland Medical Center, a nonprofit acute care hospital and academic medical center, is using funding from HCIA R2 to implement the LINCC program. The program is being implemented at a total of four sites in the Cleveland, Ohio, area: Seidman Cancer Center (main campus in downtown Cleveland) and three of its community satellite clinics. Seidman Cancer Center is a freestanding, comprehensive cancer hospital on the Cleveland Medical Center campus that houses a multitude of specialists and services for cancer care. The community satellite clinics are extensions of Seidman Cancer Center located in suburban Cleveland. The awardee's initial plan was to implement the program at a total of six sites—the main campus and five community satellite clinics—however, program rollout in the satellite clinics was delayed because the awardee first needed to hire more nurse care coordinators and establish the program at the main campus. At the time of the first annual report, three sites (the main campus and two satellite clinics) had implemented the program. The program is now implemented at four sites (the main campus and three satellite clinics). The awardee no longer plans to implement the program at the two remaining satellite clinics included in the awardee's initial plan.

The program's target population is adult Medicare and Medicaid beneficiaries who are receiving care at Seidman Cancer Center for complex cancers. Eligible participants include patients with late stage (stage 3 or 4) solid tumors; patients with regionalized malignancies with significant comorbidities; patients with disease progression; and patients with cancer who also have other risk factors for poor outcomes, increased expenditures, or high acute service utilization. Patients are primarily identified through a data management system, which generates a list of potentially eligible patients sorted by insurance status and disease stage. Providers at Seidman Cancer Center can also refer eligible patients to the LINCC program. Cleveland Medical Center intends to serve 1,503 enrollees in the program over the course of the cooperative agreement.

The LINCC program consists of a clinical intervention that provides care management and palliative care. Patient care at Seidman Cancer Center is organized around specific cancers (lung, breast, head and neck, gynecological) with "disease teams" made up of doctors and nurses who specialize in treating a specific cancer. The LINCC nurse care coordinators work with one or more of these particular teams to manage patient care. The nurse care coordinators follow the patient through treatment, link patients to health system and community resources, and engage and educate patients and their families. They also work with patients and families to develop advanced directives and promote adherence to patient-centered care plans, which review patients' goals, future appointments, and current medications. Two palliative care providers (one physician and one nurse practitioner) deliver early and ongoing palliative care to improve management of pain and other symptoms along with addressing other domains of palliative care. The program also has two secondary interventions. For the spiritual intervention, a spiritual care coordinator (who was hired in the sixth program quarter) provides emotional and spiritual support. The pharmacy intervention, which is still in development, is expected to provide savings in the costs for drugs.

To help identify and assess participants' needs, the LINCC program asks participants to routinely complete a biopsychosocial assessment, which is given on an iPad. The assessment includes questions from several other validated tools to evaluate patients' quality of life,

including patients' physical needs and symptoms, emotional state, and social well-being. The nurse care coordinators and palliative care providers use a patient's responses to focus their services on the patient's needs and well-being. They also encourage the oncologists at Seidman Cancer Center to review their patients' responses. For example, nurse care coordinators may refer patients with active symptoms to palliative care or they may link patients with social needs to community resources. The duration and intensity of the intervention vary depending upon the patient's needs, as determined by the iPad assessment and the patient's disease acuity.

Cleveland Medical Center's payment model consists of per beneficiary per month (PBPM) payments of $160 for program services in addition to traditional fee-for-service (FFS) payments. Clinical services that are otherwise reimbursable by payers are not covered by the PBPM payment. Table 1 summarizes the characteristics of the LINCC program.

The primary goals of the program are to (1) maintain or improve the quality of care, (2) improve the patient experience, (3) improve the efficiency of health care delivery by reducing the total cost of care, and (4) demonstrate the feasibility and sustainability of an innovative payment model to support enhanced service delivery. The program's anticipated impacts include (1) improved coordination of care, education, communication, and focus on evidence-based practices; (2) improved clinical outcomes and patient satisfaction; and (3) reduced total costs of care and more efficient use of resources, resulting in more capacity to help more participants. Although Cleveland Medical Center stated that decreases in avoidable emergency department (ED) visits, hospitalizations, and 30-day hospital readmissions were not among the program's primary goals or anticipated impacts, these measures are required by the HCIA R2 award and will be examined as part of the evaluation.

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified the following successes achieved by Cleveland Medical Center during the first year of its cooperative agreement:

- Hospital and program leaders motivated hospital staff to engage with the LINCC program. This dedication and support from leaders facilitated the successful implementation of the program.
- Unique characteristics of the community satellite clinics were conducive to program implementation, including their smaller sizes, smaller staffs, and convenient locations, as compared to the main campus.

We also identified the following challenges in implementing the LINCC program and Cleveland Medical Center's strategies for addressing them:

- Integrating the clinical intervention into the workflow at the main campus was challenging because of several barriers, including lack of buy-in from clinical staff, time and space constraints, lack of clarity about the nurse care coordinator role, and low staff morale. Several strategies were used to address these barriers, including educating staff about the program, having nurse care coordinators see patients wherever and whenever possible, and clarifying the role of the nurse care coordinator.

- Recruiting both participants and staff for the program has been challenging. After initially having difficulty with meeting its recruitment targets, the awardee instituted a number of changes to the recruitment and enrollment process that greatly increased enrollment numbers. Program leaders continue to work with human resources staff to recruit qualified candidates for unfilled positions.

Finally, we identified the following lessons learned by Cleveland Medical Center in implementing its program:

- Program success requires a dynamic team consisting of staff with varied skill sets who are willing to focus on team development. The abilities required for program success are not just technical skills but also soft skills, such as initiative, self-advocacy, and generosity. Program success also depends on having the right facilitators, such as sufficient physical space and supportive health information technology (IT).
- When working on a demonstration project, the staff and program must be adaptable and flexible. For example, the intervention was tailored to better meet the needs of participants; minor modifications continue to occur to optimize the intervention and improve efficiency.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Cleveland Medical Center made progress in the following areas:

- The program was on target to meet enrollment goals as a result of improving the automated patient identification process, increasing the number of nurse care coordinators, and fully establishing the program at three satellite clinics (in addition to the main campus).
- Cleveland Medical Center made significant progress implementing the LINCC program at three satellite clinics. Specific features of these clinics continued to facilitate implementation of the program.
- Cleveland Medical Center developed and implemented the spiritual intervention to meet the spiritual needs of participants.
- The program has benefited from continued engagement of senior leaders at Cleveland Medical Center as well as the enhanced engagement of LINCC staff with Seidman Cancer Center staff.
- Program leaders report using lessons learned from prior experiences with engaging commercial payers on value-based and risk-based contracting agreements to guide the development of the payment model, which continues to progress along planned milestones.

Over the past year, Cleveland Medical Center also made several changes to its program:

- The palliative care physician reduced her time on the grant by 30 percent in order to provide palliative care to non-LINCC patients at the satellite clinics, which helped to establish and sustain palliative care at the satellite clinics.

- Between October 2015 and July 2016, the LINCC program increased its nurse care coordinator team from four to seven nurses and hired a spiritual care coordinator. Leaders plan to hire two additional nurses for a total of nine nurse care coordinators. The four nurse care coordinator positions posted during the seventh quarter were financed with carryover funds.
- Program leaders reorganized the LINCC team so that one of the new nurse care coordinators assumed a clinical leadership position. The reorganization improved team morale and workflows and facilitated the development of a new system to track participant hospitalizations.
- The leadership team continues to modify the patient assessments, including developing protocols to administer them over the phone and making the results more accessible to the disease teams. Except for one disease team, the nurse care coordinators no longer administer the extended version of the assessment to new patients due to its length and complexity.

Below we note the key challenges that Cleveland Medical Center has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- The program has faced challenges implementing the assessment due to (1) its length and complexity, (2) difficulty administering it (both in person and over the phone), and (3) competing priorities and lack of time among busy clinical oncology teams. Program leaders are taking several steps to improve the assessment, including developing a simpler assessment and guidelines for telephone administration as well as engaging stakeholders to improve the assessment and its usability in the electronic medical record (EMR).
- Persistent difficulty with hiring a pharmacist continued to delay progress on the pharmacy intervention. To help address this issue, program leaders secured 10 percent of a medical oncologist's time to develop new protocols in order to decrease variability and cost. They are also working to secure time from a pharmacist who is already on the hospital's staff.

As Cleveland Medical Center enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Program leaders anticipate challenges with engaging payers because they do not yet have complete data showing the program's success. However, program leaders have started to engage interested payers.
- The LINCC program's partnership with the QOPI[2] certification team will help ensure that the participant assessment is implemented and sustained across the entire cancer center.
- Training two additional nurse care coordinators will allow the LINCC program to expand to all five initially identified satellite clinics. However, the awardee anticipates difficulty filling the remaining two nurse care coordinator positions during the final year of the program.

[2] ASCO's Quality Oncology Practice Initiative (QOPI®) is an oncologist-led, practice-based quality assessment program designed to promote excellence in cancer care by helping practices create a culture of self-examination and improvement.

Table 1. Cleveland Medical Center: LINCC characteristics at a glance

Program characteristic	Description
Purpose	The program is intended to lower health care costs, increase participant satisfaction, and improve or maintain quality of care for complex cancer participants through patient-centered coordination of care.
Components	• Care management: A nurse care coordinator helps the participant establish a plan of care, serves as the participant's point of contact and advocate, facilitates patient and family engagement and education, links the participant and family to resources, and ensures that outpatient care is well coordinated. • Direct care provision: Participants receive early and ongoing access to expert-level palliative care. • Health IT: Participants receive routine screening for biopsychosocial needs and assessment of quality of life to support the improvement of physical, emotional, and social well-being. • Spiritual intervention: A spiritual care coordinator provides spiritual and emotional support to participants with spiritual needs. • Pharmacy intervention: Pharmacy-related support (in development) will offer an additional route to cost savings.
Target population	Adults receiving complex cancer care at Seidman Cancer Center; eligible patients include complex cancer patients with late stage (3 and 4) solid tumors or disease progression, patients with regionalized malignancies with complicating comorbidities, and patients with other risk factors for poor outcomes and increased expenditures
Theory of change/theory of action	Patient-centered care coordination aligned with evidence-based practice will improve health care and health outcomes for participants with complex cancers, as well as reduce costs. Improvements in quality of care, participant satisfaction, and service utilization will result in (1) improved health care overall for patients with chronic or complex health conditions, (2) improved health outcomes across the continuum of complex cancer care, and (3) lower health care costs.
Payment model	Shared savings, capitated payment for care management/coordination services
Award amount	$4,675,383
Launch date[a]	2/19/2015
Setting	Comprehensive cancer center
Market area	Urban, suburban
Market location	OH
Outcomes	• Maintain or improve quality of care compared to 2013 baseline data (when available) and comparable peer group • Improve the participant-reported experience of care for a cohort of complex cancer patients by 5% from 2013 over a comparable peer group • Improve the efficiency of health care delivery by reducing total cost of care for a cohort of complex cancer patients by 8% from 2013 • Demonstrate feasibility and sustainability of an innovative, asymmetrical, shared savings payment model to support enhanced service delivery • Decrease in avoidable ED visits, hospitalizations, and 30-day hospital readmissions (these are not among the awardee's stated outcomes but these measures are required by the HCIA R2 cooperative agreement and will be examined as part of this evaluation)

[a]After the initial planning period, the awardee's program began to operate as of this date.
ED = emergency department; IT = information technology; LINCC = Learning Individual Needs and Coordinating Care

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Cleveland Medical Center in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 13 to June 23, 2016. For the analyses of Cleveland Medical Center's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with program leaders, frontline staff, and other program stakeholders, including the following:

- Program manager
- Program director
- Data analytics director
- Payment model director
- Nurse care coordinators
- Palliative care provider
- Spiritual care coordinator

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Cleveland Medical Center's implementation progress during

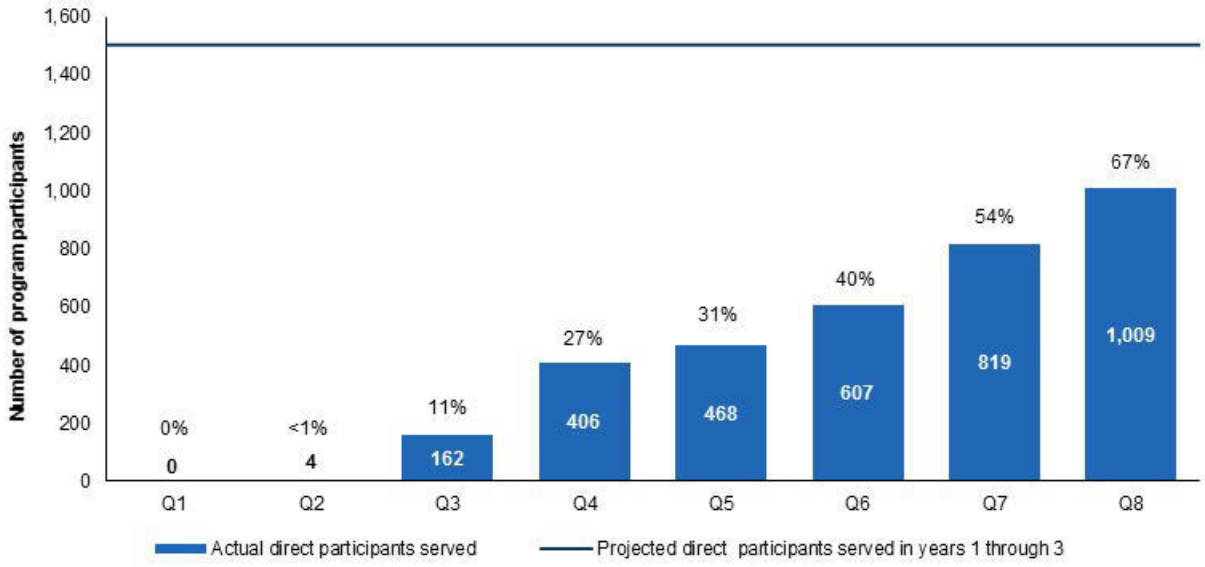
[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Cleveland Medical Center reported to the implementation and monitoring contractor that it directly served 1,009 participants from February 2015 through August 2016, which represents about 67 percent of its 1,503 projected direct participants (Figure 1). Interview respondents attributed this on-target enrollment to improvements in the program's new automated patient identification process, the recent increase in nurse care coordinators, and the planned expansion to additional satellite clinics. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. UHCMC does not have indirect participants.

Cleveland Medical Center's progress in meeting its three-year enrollment goal was influenced by several factors. Most notably, the project team optimized the automated patient identification system, which greatly reduced the amount of time spent identifying eligible participants. At the time of the first site visit (October 2015), the LINCC program had just implemented a new process for identifying patients using CAISIS, a data management system that generates lists of potentially eligible participants. During the fifth quarter, the awardee estimated that this new process reduced patient identification time by 90 percent, freeing up staff time for other tasks. However, the awardee noted that a generated list is only as complete as the EMR, which often lacks disease staging information. The nurse care coordinators must consult

with the disease teams to confirm the disease staging; positive working relationships facilitate this process.

Expansion of the nurse care coordinator coverage from the main campus to three (of the five) originally identified satellite clinics has helped increase enrollment. Many patients prefer receiving care at the smaller satellite clinics; therefore, increased program presence at locations east and west of downtown Cleveland expanded the pool of potential participants. Although the palliative care physician began seeing patients at three satellite clinics in the fourth program quarter, the program was not fully implemented at these satellite clinics until a nurse care coordinator transitioned full-time to two of the satellite clinics (the two west side locations) during the seventh program quarter and another nurse care coordinator began spending time at the third satellite clinic (an east side location). The presence of the nurse care coordinators has prompted oncologists to refer patients to the program. In addition, because the palliative care physician sees both LINCC and non-LINCC patients, the oncologists do not have to first determine if patients are eligible for LINCC, which has made it easier for them to refer more potential LINCC participants to palliative care.

> "I think we are much more visible to the inpatient team. I think they all know about us now. I think that in and of itself has really helped. I think they refer a lot of people to us now. The residents learn about us and will say, 'This would be a good person for the LINCC program.' They will send us names of people. I think it has helped in that regard."
>
> *— Palliative care provider*

Increasing the nurse care coordinator team from four to seven nurses allowed the LINCC program to ensure quality while still reaching enrollment targets. Cleveland Medical Center realized that the ideal patient-to-nurse ratio was lower than originally anticipated. Therefore, increasing the nurse care coordinator team to seven members (with plans to increase to nine) allowed nurse care coordinators to provide services for enrolled patients while still increasing program enrollment.

The nurse care coordinators have begun working more closely with the inpatient palliative care team to ensure a smooth transition from inpatient to outpatient care, which also helps identify patients for the LINCC program. They have also implemented a tracking process to monitor patient transitions in and out of inpatient care. In addition, the awardee reported that when the outpatient disease teams were engaged it was more likely that their patients would also be receptive to the program. To streamline the referral process for the inpatient palliative care teams and outpatient disease teams, one nurse care coordinator triages newly enrolled participants to the correct nurse care coordinator.

Although the LINCC program has made progress in meeting its enrollment goals, human resource constraints continue to pose a challenge to enrollment. As of the seventh program quarter, the LINCC program had nurse care coordinators at only three of the five originally identified satellite clinics in addition to having nurse care coordinators at the main campus. Program leaders are planning to send nurse care coordinators to the additional two satellite clinics once more nurse care coordinators are hired. The nurse care coordinators are encouraged to enroll four new patients a week. However, it is difficult to balance these enrollment goals with caring for caseloads currently exceeding 100 patients per nurse care coordinator. The awardee is

working to find the best balance to meet enrollment targets while ensuring high quality of care for all participants.

B. Implementation of the service delivery model

In the second year of the cooperative agreement, Cleveland Medical Center has made substantial progress in implementing the LINCC program. Program leaders and staff have worked to make the LINCC program more established at the main campus and to fully expand it to three satellite clinics. In addition, the program has developed and implemented the spiritual intervention, which is led by a spiritual care coordinator who was hired in the sixth program quarter. The awardee's progress in implementing the LINCC program has enabled leaders and staff to focus on making improvements to the quality and efficiency of the program via operational tweaks, changes to the program's leadership structure, and adaptions to the clinical intervention. The factors that facilitated or hindered implementation of the service delivery model in the second program year fall into three categories.

1. **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
2. **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
3. **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

> "We've needed to adapt our approach and our intervention to each disease team. . . You have to use a lot of creativity and re-modifying your approach to get the best outcome. . . Each of our care coordinators does things a little bit differently but gets a great result."
>
> — *Nurse care coordinator*

1. Intervention characteristics

Program staff and leaders have been able to adapt the clinical intervention to best meet the needs of the disease teams and patients. Nurse care coordinators tailored their approaches to providing services to fit into the operational style of each disease team, which has helped them integrate into the teams and provide complementary services. Nurse care coordinators also adapted their initial meeting with participants to focus primarily on establishing a relationship, rather than reviewing the iPad assessment, establishing a care plan, and developing advanced directives, all of which can be discussed in subsequent meetings. In addition, program leaders modified the one-page document that displays participants' scores from the iPad assessment in the EMR. The redesigned document includes icons and colors that make it easier to read on the computer screen; however, the printable version is not as user-friendly and program leaders plan to revise it further.

Specific aspects of the clinical intervention—namely, the iPad assessment and care plan—are complex, which creates challenges for utilizing them to their potential. Although the extended assessment underwent earlier revisions, program staff report that both the extended and short assessments are complex, time-consuming, and overwhelming for patients—in part, because they include multiple response scales. To minimize these challenges, the program is limiting the participants who receive the extended assessment to a subset of participants who are also participating in a study that the awardee is conducting to compare quality of life outcomes against a historical control. The care plan, which was initially intended to document patients' goals, is burdensome to load into and access from the EMR, so it was seldom used. Program leaders postponed the use of the care plan and began developing an electronic version to enhance usability. Many components of the care plan (for example, documentation of future appointments) are provided to patients and exist elsewhere in the EMR, but the electronic care plan will consolidate this information for all patients at Seidman Cancer Center.

Another characteristic of the service delivery model that has influenced program implementation is the development of the secondary interventions—namely, the spiritual and pharmacy interventions. In the past year, the program has made significant progress in developing the spiritual intervention to meet the spiritual needs of participants at the main campus. In the sixth program quarter, program leaders hired a part-time spiritual care coordinator, whose prior experience as a hospice chaplain enabled him to develop the spiritual care intervention, which delivers inpatient and outpatient spiritual and emotional support. The spiritual care coordinator meets regularly with and receives referrals from program staff, reviews the daily schedule of patient appointments, and proactively meets participants. Development of the spiritual intervention has strengthened the program by supporting palliative care and nurse care coordinator activities. The spiritual intervention focuses primarily on participants seen at the main campus, although program staff have on occasion asked the spiritual care coordinator to call patients who are seen at the satellite clinics.

The pharmacy intervention remains in its infancy due to ongoing challenges with filling the pharmacist position. Program leaders are, however, working to move elements of the pharmacy intervention forward in the absence of a full-time pharmacist. Specifically, the program director is working with the pharmacy department to secure a small amount of time from a pharmacist to build order sets into the EMR (for example, to develop antinausea medication protocols to decrease unwarranted variations in the ordering of antinausea medications across Seidman Cancer Center). The program also secured a small amount of time from a medical oncologist, who is developing melanoma treatment protocols to enhance evidence-conformant care and reduce cost.

2. Implementation processes

Hiring additional nurse care coordinators has helped to establish the LINCC program and move the program towards quality and efficiency. Having more nurse care coordinators has facilitated program expansion from the main campus to three satellite clinics. One nurse care coordinator now works exclusively at the two west side satellite clinics and another now spends one day a week at an east side clinic. The presence of nurse care coordinators at the satellite clinics has enabled the program's palliative care physician at the satellite clinics to focus on delivering care (rather than also performing nurse care coordinator duties, as she had done

previously), which has led to substantial growth in patient volume for palliative care at the satellite clinics. Another benefit of having additional nurse care coordinators is that it has enabled program leaders to shift their focus from merely getting the program off the ground to optimizing it. For example, program leaders have focused on the optimal pace of enrollment and reallocated the disease teams among nurse care coordinators to ease the burden of high acuity patient groups. To facilitate establishing the LINCC program at the remaining two satellite clinics, the awardee continues to recruit additional nurse care coordinators. Program leaders anticipate that it may be difficult to hire nurse care coordinators in the final year of the program, so they started evaluating candidates from multiple sources and developing retention plans for current nurse care coordinators.

A reorganization of the program's leadership structure has improved program operations. After realizing that optimal program management requires separate oversight of grant operations and personnel, program leaders selected a nurse care coordinator to serve as a clinical supervisor. The clinical supervisor leads group meetings to discuss challenges and successful strategies to address them, and to identify where nurse care coordinator services are most effective. The reorganization has improved workflows and promoted learning and real-time feedback. For example, the clinical supervisor established a system for tracking hospitalizations and discharges, which enables nurse care coordinators to follow up with participants and link them to palliative care, thus decreasing the chance of readmission.

Program leaders have used data to improve program staffing and workloads. Data on participant enrollment and staff productivity informed decisions about optimal nurse care coordinator workloads and the hiring of a patient access representative to assist nurse care coordinators with their patient caseloads. In addition, program leaders are tracking the palliative care physician's total volume of patients (both LINCC participants and non-LINCC patients) to check whether the physician is becoming overloaded, which might result in lengthy wait times for LINCC participant appointments. In the seventh program quarter, Cleveland Medical Center reported that patients waited an average of two days after enrolling to see a palliative care provider, a decrease from 15 days in May 2015. In addition, through the end of the seventh program quarter, around half of the enrolled patients were receiving palliative care in a given month. The LINCC program plans to hire a nurse partner to help the two palliative care providers with their increasing patient loads (for example, by handling phone calls to and from patients and helping with prescription refills).

A key facilitator to implementing the program has been program staff's successful engagement of and coordination with various cancer center staff. Challenges with integrating the LINCC nurse care coordinator role into the existing clinical workflow (reported last year) have largely been resolved now that the nurse care coordinators have improved communication with disease teams and the program is more established. Engagement of the disease teams has led them to view the LINCC nurse care coordinators as a valuable part of the patients' care team. Program staff have also increased engagement with the inpatient palliative care team by making weekly rounds with them and tracking hospitalized patients daily, which has helped ensure that LINCC patients receive palliative care and nurse care coordinator support after discharge. In addition, a nurse manager of the satellite clinics has embraced the program, which has encouraged staff at the satellite clinics to support the program and to refer patients to it.

As described in the first annual report, there were barriers to implementing the clinical intervention at the main campus related to its larger size and time and space constraints. In the second program year, the strategies described above have significantly improved implementation of the program at the main campus; however, barriers to implementing the assessment persist. Because the medical assistants (MAs) at the main campus frequently rotate in and out of the clinic, the program has not been able to have MAs administer the assessment; plans to do so also have been delayed. Program leaders are waiting for Seidman Cancer Center to launch a similar iPad assessment—one developed for the QOPI certification program—so that the new MA workflows will apply across the main campus, thereby minimizing disruptions. In the meantime, nurse care coordinators at the main campus are responsible for administering the assessments. Additional challenges with implementing the assessment include difficulty finding the best time to administer it, difficulty administering it by phone, and problems with the wireless Internet. To address these challenges, program leaders are engaging the developer of the electronic platform, hospital leaders, and physicians to work on improving and simplifying the assessment and making it more usable in the EMR. The implementation of the assessment at one of the satellite clinics has gone better because the QOPI assessments are already in use there, so the MAs are familiar with administering the assessments and the patients are familiar with completing them.

3. Organizational and external context

The LINCC program continues to benefit from strong engagement at all levels—from the senior leaders at Cleveland Medical Center to program staff. Hospital leaders are supportive and committed to sustaining program components because they recognize that the field of oncology care is headed towards models like the LINCC program. The hospital's investment in iPad assessments and plan to scale up their use across the cancer center reflect this buy-in. LINCC program staff are also highly engaged—due, in part, to the internal team leadership reorganization noted above. The nurse care coordinators appreciate having a clinical supervisor who herself is a nurse care coordinator and who thus understands their role. The creation of the clinical supervisor position has boosted morale among the nurse care coordinators and motivated them to collaborate to enhance the consistency of their work across disease teams.

> "One of the things that's helpful is the upper leadership of the cancer center is very supportive of these efforts. And these are things that I think the world of cancer care is hopefully moving to. And we're getting there faster with this program and really being able to learn it and collect a lot of data to be able to see is it really doing what we hope on a broad scale, much more so than I think otherwise ever could have happened, so I think that's certainly supportive."
>
> *— LINCC program leader*

Another key facilitator of the program has been its ability to successfully meet the needs of LINCC participants. Nurse care coordinators try to connect patients with palliative care while patients are already in the clinic. They also update providers on patients' needs. The program uses hospitalizations as a triggering event for LINCC participants to receive palliative care post-discharge; however, this is not done uniformly. Because palliative care is offered at no additional charge to patients, patients with active symptoms often agree to initial and follow-up appointments.

> "Someone once described to me that [if] you try to change culture at the main campus of an academic medical center, you're trying to turn a cruise boat. But when you go to the satellites, it's like driving a speed boat."
>
> *— LINCC program leader*

Nurse care coordinators continue to use regular phone calls to engage patients. As reported in the first annual report, the program decreased the intensity of the intervention (for example, the number of phone calls) for lower acuity patients, and this strategy has worked well. Lastly, the spiritual care coordinator's style of reaching out to patients (including reviewing daily appointment schedules so that he can meet with participants when they are in the clinic for scheduled oncology care appointments) has helped ensure that patients' emotional and spiritual needs are being met, even among patients who may not have initially indicated a need for spiritual support.

Consistent with early findings from the first annual report, several characteristics specific to the satellite clinics continue to facilitate smoother implementation of the LINCC program there than at the main campus. First, the small size and layout of the satellite clinics (for example, having treatment areas such as the chemotherapy infusion chairs in the same location as the exam rooms) make it easier for staff to interact with each other and with patients. Second, patients find the satellite clinics more convenient than the main campus because parking is more accessible, the check-in process is easier, and the clinics are usually closer to patients' homes. Third, the satellite clinics are more conducive to administering the iPad assessment because the staff there are not subject to shifting schedules and substitutions as staff are at the main campus. Fourth, the oncologists at the satellite clinics recognize that there is a need for palliative care at the satellite clinics (unlike the main campus, the satellite clinics did not have palliative care prior to the LINCC program), and they are engaged in the program because of the presence of program staff, which has resulted in the palliative clinic being booked and busy. Finally, the culture of the satellite clinics is compatible with that of the LINCC program. The satellite clinics tend to focus on providing a "home" for patients to get care for their cancer in all ways, which aligns with program's focus on care management.

Despite the relative ease of implementation at the satellite clinics, a few challenges—mostly related to the limited availability of resources—affect the satellite clinics specifically. Due to the number of and distance between sites, there is a limit to how much presence LINCC staff can have at the satellite clinics. Specifically, the spiritual care coordinator is at the main campus, which limits access to spiritual care at the satellite clinics. To compensate, program staff can refer patients to speak with the spiritual care coordinator by phone. They can also use Seidman Cancer Center's existing social workers to meet participants' needs or refer patients to external resources. In addition, because the palliative care physician provides palliative care to patients at three satellite clinics, her time at any one clinic is limited. She has been flexible with her schedule and has offered to meet patients at a different satellite clinic than their usual clinic to ensure that patients are seen promptly. Despite these staffing challenges, the program still plans to send nurse care coordinators to two more satellite clinics into which the program will be expanding.

Both program and Seidman Cancer Center staff face resource and time constraints that interfere with implementing the LINCC program. For example, space for the program at the main campus is limited. Nurse care coordinators meet patients at the infusion center and coordinate with disease teams to see patients when physicians are running behind schedule in order to work around space constraints at the main campus. Limited time and competing priorities of the physicians at Seidman Cancer Center also interfere with the program, especially with respect to the assessment. Asking physicians already inundated with patients and work to

review assessment results before seeing patients is challenging. As a result of the physicians' limited time, the nurse care coordinators are mainly responsible for reviewing the assessment results and relaying information to physicians. Program leaders are working on a way to enable physicians to access assessment results more readily.

C. Development of the payment model

Cleveland Medical Center's payment model proposes using a PBPM payment for program services in addition to traditional FFS payments. The payment model is progressing along planned milestones and is currently in the "marketing stage." Program leaders have continued discussions with payers, one of which has an oncology medical home model that may align with the LINCC model. Another payer is interested in exploring bundled payments for oncology care. The data analytics director continues collecting data to build the business case for the payment model and is refining a comparison group to be matched with the treatment group based on demographic characteristics. Upon completion of the cost analysis, program leaders will discuss how best to share the data with payers. Cleveland Medical Center adjusted the original PBPM of $150 to $160, and leaders think this revised number is reasonable as it is comparable to the PBPM payment in the Oncology Care Model.

Cleveland Medical Center's previous experience working with commercial payers on value-based and risk-based contracting agreements, such as through a pediatric program funded through the first round of HCIA, facilitates the development of the payment model. Program leaders report using lessons learned from these previous experiences to engage payers. For example, they learned to seek input from payers early to build a sense of shared ownership for the program.

Challenges in gathering data to show program impacts, especially when the intensity of the intervention varies by patient acuity, present a barrier to developing the payment model. According to the awardee, the biggest challenge with the payment model is communicating the value of the program as a carve-out to existing contracting arrangements. Program leaders speculate that the intervention is not being applied consistently (because it depends upon patients' disease acuity) and that this may make it more difficult to determine whether the program is beneficial overall or just among certain subsets of patients, such as patients with higher needs or patients in disease teams that tend to have higher acuity patients. The awardee is considering running analyses to see if there are greater improvements in outcomes and savings among patient subgroups. If impacts are larger for some groups, the program could be refined in the future to target those likely to benefit the most. Another challenge concerns lack of data on costs, a situation that may make it difficult to show program impacts. Specifically, the awardee is able to obtain hospice utilization from University Hospitals (UH) and from one large hospice center that is not UH-owned, but it lacks hospice utilization and acute care cost and utilization data for services provided outside of UH.

A final barrier to developing the payment model is that payers are busy with their own internal programs and are reluctant to engage in a model that is unique to one hospital system. In response, program leaders strategically began payment model discussions with the medical directors of two payers that are interested in innovative oncology payment models so that the LINCC payment model could potentially be incorporated into those payers' existing projects.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

For the purposes of this report, the Cleveland Medical Center's treatment group consists of Medicare FFS beneficiaries who enrolled in the awardee's program between February 19, 2015, and May 31, 2016. In future, the Medicaid sample is anticipated to be large enough to detect an impact on key outcomes and may be included in the impact evaluation at a later date if the data become available.

A. Baseline characteristics of the treatment group

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS (both Parts A and B) with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all evaluation criteria for a period of at least 90 days during the baseline year (the 365 days immediately before their enrollment). The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, a total of 327 participants were included in the analysis of baseline characteristics for this report.

The demographic characteristics of program participants are similar to those of Medicare FFS beneficiaries nationwide (Table 2). Most participants are either 65 to 74 years old (48 percent) or 75 to 84 years old (29 percent). The sample skews female (55 percent) and is predominately white (73 percent). Fourteen percent of participants are dually eligible for Medicare and Medicaid. The average hierarchical condition categories (HCC) risk score of participants (3.74) is nearly four times higher than the national average for Medicare FFS beneficiaries (approximately 1.00). Nearly all of the participants have HCC risk scores higher than the national average.

Program participants had high and increasing rates of service use and Medicare expenditures in the baseline year. Table 3 shows baseline utilization and expenditure data for a common set of measures. We examined baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $3,719—far above the U.S. average of $792.[4] Average PBPM Medicare payments for acute inpatient ($1,383) and outpatient ($1,371) services were the largest drivers of total cost of care.

[4] See the report on Medicaid enrollment from the Medicare Payment Advisory Commission and the Medicaid and CHIP Payment and Access Commission at http://www.medpac.gov/documents/data-book/january-2015-medpac-and-macpac-data-book-beneficiaries-dually-eligible-for-medicare-and-medicaid.pdf.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 327)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	46	14
65 to 74	158	48
75 to 84	95	29
85 and older	28	9
Gender		
Female	179	55
Male	148	45
Race		
White	240	73
Black	75	23
American Indian, Alaska Native, Asian/Pacific Island American, or other	5	2
Hispanic	1	0.31
Original reason for Medicare eligibility		
Old age and survivor's insurance	261	80
Disability insurance benefits	66	20
End-stage renal disease (ESRD)[a]		
Hospice[b]	3	0.92
Medicare/Medicaid dual status, percentage dual[b]	46	14
HCC score[c]		Statistic
Mean		3.74
25th percentile		2.46
Median		3.54
75th percentile		4.8

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the first day of the month in which the beneficiary began receiving HCIA R2-funded services. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	327	303	309	326	327
Average Medicare expenditures PBPM[a]					
Total	3,719 (192)	2,645 (285)	2,881 (339)	3,578 (331)	5,581 (343)
Acute inpatient	1,383 (118)	904 (172)	909 (253)	1,219 (194)	2,380 (262)
Inpatient other[b]	61 (23)	57 (41)	29 (26)	92 (50)	66 (33)
Outpatient[c]	1,371 (102)	1,041 (151)	1,144 (128)	1,334 (148)	1,921 (115)
Physician services	617 (47)	449 (48)	541 (63)	602 (90)	857 (50)
Home health	93 (11)	62 (15)	69 (17)	119 (24)	120 (19)
Skilled nursing facility	123 (25)	75 (29)	122 (52)	151 (46)	142 (40)
Hospice	12 (7)	0 (0)	0 (0)	13 (9)	34 (18)
Durable medical equipment	59 (9)	58 (19)	66 (15)	49 (10)	61 (9)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	1,184 (89)	747 (116)	824 (141)	1,040 (149)	2,023 (174)
Outpatient emergency department (ED) visits	795 (119)	520 (109)	720 (131)	723 (130)	1,189 (220)
Observation stays	183 (29)	13 (13)	183 (54)	216 (171)	306 (61)
Primary care visits in any setting	7,685 (389)	6,162 (619)	6,530 (596)	7,193 (663)	10,640 (697)
Primary care visits in ambulatory settings	5,376 (259)	4,601 (347)	4,972 (436)	4,910 (351)	6,913 (421)
Specialist visits in any setting	18,982 (761)	14,724 (1,031)	15,022 (961)	18,510 (1,109)	27,053 (1,143)
Specialist visits in ambulatory settings	14,155 (515)	11,710 (682)	12,026 (640)	14,031 (753)	18,510 (628)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with hospital admission[d]	60 (3)	14 (2)	15 (2)	18 (2)	37 (3)
Percentage with an outpatient ED visit[e]	41 (3)	10 (2)	13 (2)	14 (2)	19 (2)
Percentage with an observation stay[f]	16 (2)	0 (0)	4 (1)	5 (1)	7 (1)
Percentage with a 30-day readmission among all discharges	26 (3)	20 (6)	35 (6)	20 (5)	28 (4)
Percentage of participants with a readmission among all participants	16 (2)	3 (1)	3 (1)	3 (1)	8 (2)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

The rate of acute care hospitalizations for participants was 1,184 per 1,000 Medicare FFS beneficiaries per year during the baseline year (a rate much higher than the U.S. average of 274 per 1,000 Medicare FFS beneficiaries per year[5]), with 60 percent of participants having at least one hospitalization during the baseline year. The rate of acute care hospitalizations for participants was highest in baseline quarter 4 (2,023 per 1,000 Medicare FFS beneficiaries per year) compared with baseline quarters 1 through 3 (747 to 1,040 per 1,000 Medicare FFS beneficiaries per year). About 37 percent of participants had at least one hospitalization during baseline quarter 4.

The rate of emergency department (ED) visits that did not lead to a participant's hospitalization in the baseline year was 795 per 1,000 Medicare FFS beneficiaries per year. The rate of observation bed stays in the baseline year was 183 per 1,000 Medicare FFS beneficiaries per year. The rate of primary care visits in any setting was 7,685 per 1,000 Medicare FFS beneficiaries per year. The rate of specialty visits in any setting was 18,982 per 1,000 Medicare FFS beneficiaries per year. All of these rates were higher in baseline quarter 4 compared with quarters 1 through 3.

In the baseline year, 26 percent of hospital discharges among all discharges were followed by a readmission in the 30-day post-discharge window, whereas 16 percent of all Medicare FFS beneficiaries had a hospitalization with a readmission in the 30-day post-discharge window.

Table 4 provides estimates of the use of chemotherapy and non-palliative radiation therapy, hospice, and ICU admissions among deceased beneficiaries in the treatment group to date. Of the 113 individuals in the treatment group who died, 20 percent received chemotherapy or non-palliative radiation therapy in the last 14 days of life. About 35 percent of the deceased treatment group patients received no hospice care. In addition, 11 percent of the deceased treatment group patients were admitted to the ICU in the last 30 days of life. Future reports will provide updated estimates of these measures in both the treatment and comparison groups.

Table 4. Awardee-specific measures for Cleveland Medical Center

Measures	Denominator	Numerator	Percentage
Percentage of deceased patients who received chemotherapy or non-palliative radiation therapy in the last 14 days of life	113	23	20.4
Percentage of deceased patients who were not admitted to hospice	113	39	34.5
Percentage of deceased patients admitted to the ICU in the last 30 days of life	113	12	10.6

Note: Average rates adapted from prior literature: chemoradiation therapy, 8 percent (adding 2 percentage points to account for non-palliative radiation therapy); hospice nonadmission, 46 percent; ICU admission, 25 percent. Source: Morden, N. E., C.-H. Chang, J. O. Jacobson, E. M. Berke, J. P. W. Bynum, K. M. Murray, and D. C. Goodman. "End-of-Life Care for Medicare Beneficiaries with Cancer Is Highly Intensive Overall and Varies Widely." *Health Affairs,* vol. 31, no. 4, 2012, pp. 786–796.

[5] For national average rates, see the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation" at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed July 1, 2016.

In future reports, we will expand our reporting of baseline utilization and expenditure characteristics to the comparison group.

B. Identifying a comparison group

In order to identify an appropriate comparison group, we obtained data from the Ohio Department of Public Health's Ohio Cancer Incidence Surveillance System, which is the state's cancer registry program. We obtained identifiers and cancer registry data (type of cancer, stage at diagnosis, and so on) for all individuals diagnosed with cancer in Ohio between January 2010 and December 2015.

As described in the evaluation report, the awardee has concerns about drawing the comparison group from the same counties in Ohio where the intervention is operating (Cuyahoga, Lorain, and Medina counties). The awardee believes that comparing its treatment group outcomes against outcomes among a comparison group of patients treated at the Cleveland Clinic would bias the evaluation because of the Cleveland Clinic's long-established palliative care program which does not reflect the usual standard of care.

Given these concerns, we evaluated sites of inpatient and outpatient care for potential comparison group members. About 75 percent of potential comparison group members residing in the three Cleveland-area counties were treated at Cleveland Clinic sites. Therefore, we have drawn the comparison group pool from a cluster of counties around Columbus, Ohio. In those seven counties, only 2 percent of individuals with cancer were treated at the Cleveland Clinic. We will exclude those individuals from the potential comparison group pool.

In future reports, we will provide details on the comparison group matching process and the results.

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Cleveland Medical Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	511
Projected Medicaid population with 6 months of program exposure	178
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	634
Likelihood of all-cause hospitalizations	489
MDE sample size requirement to detect 20% effect	
Total expenditures	159
Likelihood of all-cause hospitalizations	122
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff survey
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We plan to carry out a rigorous analysis of the UHCMC intervention. The sample size is projected to be sufficient to detect effects of less than 20 percent of Medicare spending. We are currently selecting a matched comparison group using data from the Ohio cancer registry program. Matching variables for the comparison group include age, sex, cancer site, cancer stage, county of residence, and prior Medicare spending.

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V. NEXT STEPS

A. Implementation evaluation

As Cleveland Medical Center enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next step in the impact evaluation is to finalize the propensity score matching process. We will produce a table of descriptive characteristics for each group before and after matching. We will then produce initial impact estimates for the first one to two quarters of program operations, depending upon data availability, after creating our outcome and explanatory variables. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we administered a survey of non-clinician staff affiliated with the program. The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include nurse care coordinators, program leaders, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

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APPENDIX B.32.

BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS, CHICAGO

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REPORT

APPENDIX B.32

HCIA Round Two Evaluation: Board of Trustees of the University of Illinois, Chicago

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Coordinated Health Care for Complex Kids (CHECK) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress made by the Board of Trustees of the University of Illinois, Chicago in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of Illinois made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the University of Illinois addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics for the treatment and control groups of the University of Illinois' Medicaid enrollees, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the University of Illinois' CHECK program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment and control groups of Medicaid enrollees (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of Illinois is using funding from HCIA R2 to implement the CHECK program, which is intended to improve care coordination for children and young adults (ages 25 and younger) who have chronic medical conditions and who live in Cook County, Illinois. The program is housed in the university's College of Medicine, but the awardee is trying to engage participants "where they are."

The CHECK program comprises several components:

- **Care coordination.** Community health workers enhance care coordination for participants and their families by providing them with customized support for their health and social needs. Each worker is assigned to a care coordination team, which is led by a care coordinator and organized according to the area in which the participant lives. Community health workers meet with participants at their homes, at social service agencies, at community- and school-based health centers, and at other local sites that are convenient for the participants and their families. These staff also help participants connect to mobile oral health services.
- **Mental health services.** Staff on the mental health team staff provide mental health promotion, early intervention, and referral services
- **Health technology (IT) and telemedicine.** CHECK offers telemedicine tools such as online self-education portals, a two-way text messaging platform, and virtual home visit technology to support participant engagement in the program. Staff also use customized software to support care coordination and to track participant engagement.

To be eligible for the program, participants must (1) be diagnosed with diabetes, sickle cell disease, asthma, or prematurity, and (2) be enrolled in a Medicaid managed care plan under contract with the CHECK program or be Medicaid beneficiaries who are not eligible for managed care (that is, Medicaid fee-for-service [FFS] beneficiaries).

The University of Illinois uses a passive enrollment strategy and categorizes involvement in the program into three stages: (1) enrolled, (2) engaged, and (3) activated. CHECK staff identify eligible beneficiaries in Medicaid claims data and consider them to be enrolled when an enrollment letter is sent to the family. Enrolled participants or their families can opt out of the program at any time. The awardee considers enrolled participants to be engaged after a CHECK staff member begins an initial needs assessment with the participant or the family by phone or in person. Engaged participants are considered to be activated when the program's care coordination software generates a care plan for them based on the data in the needs assessment. The community health worker reviews the care plan with the participant and his or her family to identify the tasks that CHECK staff will carry out based on the participant's needs, as indicated in the initial assessment. Once activated, participants begin receiving program services. The awardee intends to enroll nearly 9,000 children and young adults over the course of the program

and provide services to at least 4,000 individuals enrolled in the program.[2] The CHECK program began serving participants in December 2014.[3]

The University of Illinois expects to accomplish three goals by the end of the three-year cooperative agreement:

1. Increase the number of participants and families who are actively engaged in their own care
2. Improve participants' health and quality of life, including improving school attendance
3. Reduce the total cost of care for the patient population

The awardee hypothesizes that enhancing the coordination of care for children with chronic medical conditions will increase their access to health and social services and improve the management of their conditions. Care coordination activities are being supported by new software and consumer-facing technology. Improved access to social services and to primary, specialty, and mental health care will result in better health and social outcomes, fewer hospitalizations and emergency department (ED) visits, and lower costs. Other key characteristics of the CHECK program are described in Table 1.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the University of Illinois during the first year of its cooperative agreement.

- As of August 2015, the University of Illinois had exceeded its enrollment target for the first program year.
- As of October 2015, the awardee had hired all key administrative staff and most of its frontline workforce. CHECK staff worked with subspecialty medical directors and a training partner to develop and implement disease-specific training for community health workers and to create care coordination protocols for each of the targeted conditions.
- In the first year of implementation, the University of Illinois partnered with technology vendors (Clear Tec Solutions and Purple Binder) to develop and roll out customized care coordination software (Consensus) in order to integrate social service resources.
- The University of Illinois developed and promoted an online portal to give participants and their families access to disease-specific, self-education materials. The awardee also launched

[2] We based the figures in this report on data submitted by the University of Illinois to the implementation and monitoring contractor. However, we noted some discrepancies between these figures and other data sources. Specifically, in site visit interviews conducted by Mathematica in July 2016 and in subsequent correspondence, the awardee reported a three-year target of 6,000 participants who would receive services rather than the 4,000 reported to the implementation and monitoring contractor. The number of direct participants served, as reported to the implementation and monitoring contractor, appears to correspond more closely with total enrollment than with the number of participants receiving CHECK services. We will seek clarification from the awardee on the projected and the actual number direct participants served, and we will provide updated figures in future reports.

[3] We used the program "launch date" that was submitted to the implementation and monitoring contractor to determine when the CHECK program began serving participants.

a pilot of an SMS application to identify promising text messaging strategies for the care coordination team.

We also identified several initial challenges in implementing the program and the University of Illinois's strategies for addressing them.

- Since the University of Illinois applied for HCIA R2, the Illinois Medicaid agency transitioned to mandatory managed care for nearly all of the target population. The awardee therefore had to work with individual managed care plans, as opposed to the state Medicaid program, to obtain the claims data needed to identify eligible participants. As of October 2015, the awardee had contracted with two managed care plans and was pursuing agreements with others.
- The transition to managed care for the Medicaid population affected the University of Illinois' ability to engage community-based health centers in program implementation. Many community health center networks have their own care coordination initiatives and want to manage care coordination internally.
- The awardee struggled to assess and engage enrolled participants while it was developing its workforce and technology infrastructure.

Finally, we identified several early lessons learned by the University of Illinois in implementing its program.

- Program leaders felt limited by a condensed planning period, which hampered their ability to ensure that their staffing and technology infrastructure was sufficient before enrolling beneficiaries.
- CHECK staff had to adapt program strategies to changing realities while maintaining a commitment to the program's core mission. For example, the care coordination teams have had to adapt to ongoing challenges with the software implementation process, creating workarounds for functions that were delayed while continuing to enroll beneficiaries and provide services.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of Illinois made progress in the following areas:

- As of August 2016, the awardee reported that it exceeded its enrollment target and provided services to 10,221 participants.[4] New agreements with managed care plans facilitated enrollment. The awardee also secured an agreement to receive participants' managed care data directly from the state rather than from each managed care organization (MCO).

[4] The awardee reported to the implementation and monitoring contractor that it had enrolled 16,625 participants since the program began. The awardee reported to the implementation and monitoring contractor that it provided direct services to 10,221 participants, which corresponds to the number of participants engaged in the CHECK program.

- CHECK program leaders established several critical partnerships that facilitated program implementation. For instance, several community and school-based health centers began hosting community health workers at their sites in Year 2. Program leaders also finalized an agreement with the Chicago Public School system to receive data on student absenteeism, which will support the assessment of school attendance outcomes.
- CHECK program staff developed more detailed care coordination protocols and rolled out new communications technology (an SMS messaging system and a virtual home visit platform) to provide more ways for participants and care coordination staff to stay in contact between in-person visits.
- CHECK program leaders engaged an actuarial firm (Milliman) to evaluate and price the program's various components as part of the next steps in developing the payment model.

Over the past year, the University of Illinois also made several changes to its program:

- Program leaders restructured the care coordination staffing model. The new model has more teams, each of which comprises fewer community health workers led by a care coordinator to allow for greater collaboration within each team and adaptability to the target area to which each team is assigned.
- Program leaders also promoted a member of the mental health promotion team to director of this program component. This individual, rather than focusing on the underlying theory and design of the component as his predecessor did, focused on operations and collaboration with other CHECK teams. Under his leadership, the program continues to adapt its approach to providing mental health promotion and early intervention services to program participants and their families.

Below we note the key challenges that the University of Illinois has worked to address in the second year of its cooperative agreement.

- Staffing changes at one technology vendor made it difficult to move forward with the care coordination software as envisioned because the staff who developed and first launched the software are no longer working for the vendor and other staff have been unable to implement the software as planned. Program leaders are considering several options for working with the vendor as they address this barrier; they are also considering consulting with other care coordination programs in Chicago to learn from their experience.
- Program leaders continued to face the challenges often associated with a program embedded in a large public university. The university's hiring policies and the state's procurement policies have, respectively, made it difficult to hire staff and to negotiate contracts in a timely way.

As the University of Illinois enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Because of Illinois' continued failure to finalize a state budget, the University of Illinois is working to find alternatives to disappearing or struggling state-funded community-based support functions, such as reimbursed transportation for Medicaid patients

- CHECK will face the continued challenge of integrating technology-based products into the institutional EHR system.
- CHECK plans to hire additional staff in the final year, and despite streamlining the hiring process, expects to have continued challenges in navigating the university system to hire staff.
- The University of Illinois expects to build on its success in engaging more patients and continuing to exceed enrollment and engagement goals.

Table 1. University of Illinois: CHECK characteristics at a glance

Program characteristic	Description
Purpose	The Board of Trustees of the University of Illinois, Chicago (UIC) is implementing the CHECK program to improve care coordination for children with complex medical conditions in Cook County, IL. The program sends community health workers to participants' homes, social service agencies, community- and school-based health centers, and other local sites convenient for the participants and their families.
Components	• Enhanced care coordination (primary) • Mental health promotion, early intervention, referral, and oral health services (secondary) • Telemedicine tools (online self-education portal, two-way text messaging, and virtual home visit technology) (secondary) • Health IT (care coordination software with integrated social service resources) (secondary)
Target population	Enroll more than 9,000 children and young adults (age 25 and younger) with chronic medical conditions, initiate assessments with approximately 4,000 participants,[a] and create care plans for approximately 5,000 participants by the end of the ninth program quarter. Participants must meet the following criteria: • Diagnosed with diabetes, sickle cell disease, asthma, or prematurity • Enrolled either in a Medicaid managed care plan under contract to the CHECK program or in a Medicaid FFS plan
Theory of change/theory of action	The awardee hypothesizes that enhancing care coordination for children with chronic medical conditions will increase their access to care and improve the management of their conditions. Community health workers provide care coordination services in the community with support and guidance from care coordinators who lead each care coordination team. The CHECK program will support care coordination activities with new software and consumer-facing technology. Improved access to social services and to primary, specialty, and mental health care will result in better health and social outcomes, fewer hospitalizations and ED visits, and lower costs.
Payment model	New FFS payment, capitated payment for care management/coordination services
Award amount	$19,581,403
Launch date[b]	December 2014
Setting	Community health workers engage participants and families at home or in the community. Staff on the mental health promotion team provide direct promotional and early intervention services to participants by phone and in the CHECK offices. Care coordination and mental health services are also provided through telemedicine tools (for example, SMS platform). The awardee is partnering with a mobile health van to provide oral health services.
Market area	Urban
Market location	Cook County, IL
Outcomes	• Increase the number of participants and families actively engaged in their own care • Improve participants' health and quality of life, including improving school attendance • Reduce total cost of care for the patient population

[a]This report is based on data submitted by UIC to the implementation and monitoring contractor. However, in our site visit interviews and in the program narratives submitted by UIC to the implementation and monitoring contractor, the awardee reported that it plans to engage, and to provide services to, at least 6,000 participants. UIC also reported that it expects to enroll 30 to 40 percent more than this (7,800 to 8,700).

[b]After the initial planning period, the awardee's program began to operate as of this date.

FFS = fee-for-service

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of Illinois in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during in-person interviews with program staff on July 19 and July 20, 2016. For the analyses of the University of Illinois' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Program leaders
- Staff supporting the deployment of the program's health IT and telemedicine tools
- Staff responsible for engaging CHECK's community partners
- The program's outcomes and evaluation leader
- Care coordinators
- Community health worker teams
- Representatives from two partnering community health centers

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[5] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the University of Illinois' implementation progress during the

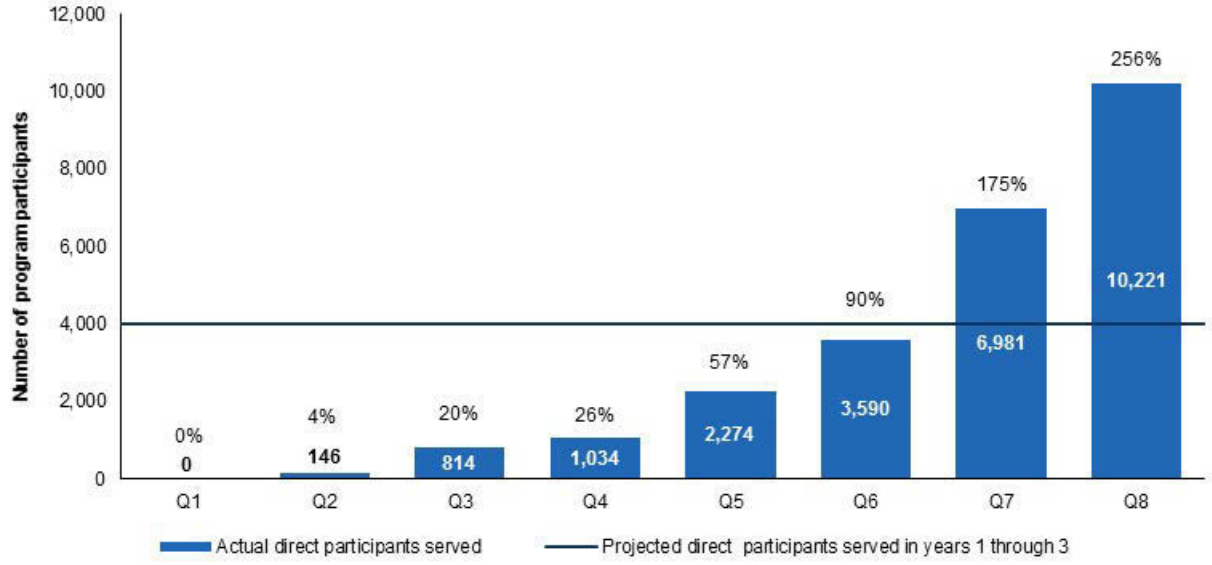
[5] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Overall, the University of Illinois reported to the implementation and monitoring contractor that it directly served 10,221 participants from December 2014 (the launch of its program) through August 2016, which represents about 256 percent of its 4,000 projected direct participants (Figure 1). The baseline characteristics of participants whom we identified in the Medicaid managed care and FFS enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. UIC does not have indirect program participants.

We based the figures in this report on data submitted by the University of Illinois to the implementation and monitoring contractor. However, we noted some discrepancies between these figures and other data sources. Specifically, in site visit interviews conducted by Mathematica in July 2016 and in subsequent correspondence, the awardee reported a three-year target of 6,000 participants who would receive services rather than the 4,000 reported to the implementation and monitoring contractor. The number of direct participants served, as reported to the implementation and monitoring contractor, appears to correspond more closely with total enrollment than with the number of participants receiving CHECK services. We will seek clarification from the awardee on the projected and the actual number direct participants served, and we will provide updated figures in future reports.

During the program's second year, program leaders revised CHECK's initial enrollment target upward from 6,000 to 9,000 participants. Program leaders noted that this increase was required in order to meet their goal of engaging and activating at least 4,000 participants, based on their experience from the first year of the award.[6]

Three factors influenced the University of Illinois' progress in meeting its revised three-year enrollment goals: (1) new partnerships with community- and school-based health centers, (2) progress in securing agreements with additional MCOs, and (3) a data sharing agreement with the state Medicaid agency.

First, community health workers began working directly with their new partners—community- and school-based health centers—during the second year of the program. In making themselves available in the health centers frequented by participants, community health workers created another opportunity to engage enrolled participants and to encourage referrals from providers.

Second, CHECK program's leaders' progress securing agreements with additional Medicaid managed care organizations (MCOs) also facilitated enrollment. In addition to their existing relationship with one MCO, the CHECK program established a contract with a second MCO as a recruitment source for additional participants. Program leaders reported that they continued negotiating with a third MCO.

Third, program leaders finalized an agreement with the state Medicaid agency on the final process for exchanging claims data. The agreement allows the University of Illinois to receive claims data on all CHECK participants directly from the state rather than from individual MCOs. This process ensures that the awardee receives more complete data in a consistent format, making it easier to accurately identify individuals eligible for the program.

B. Implementation of the service delivery model

CHECK program staff made significant progress in implementing the care coordination, health IT, and mental health components of the program's service delivery model during the second year of the program. The staff shifted their focus from conducting outreach for newly enrolled participants to continually engaging participants and connecting them to services, as demonstrated by an increase in documented care plans for activated participants from 44 percent in August 2015 to 88 percent in August 2016. CHECK program staff have gradually implemented telemedicine and other technologies, and they have restructured the care coordination teams to make it easier for them to interact with program participants and their families.

[6] As noted above, this report is based on data submitted by the University of Illinois to the implementation and monitoring contractor. However, in site visit interviews and in the program narratives submitted by the University of Illinois to the implementation and monitoring contractor, the awardee reported that it plans to engage and activate (that is, provide service to) at least 6,000 participants.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Respondents cited two primary intervention characteristics that facilitated the implementation of the CHECK program: (1) the relative advantage of the program over traditional service delivery models and (2) a program design that builds on the personal experiences and feedback of members of the care coordination team.

First, respondents at all levels said that CHECK improved on traditional service delivery models by providing necessary, personalized service to underserved, high-need populations. Program staff pointed to the fact that the program is designed to serve a population with significant social and other needs in addition to the targeted chronic health conditions, such as housing instability, food insecurity, employment or legal challenges, low literacy, and often, mental health conditions. Care coordination staff noted that although CHECK care plans are designed to address physical and mental health needs, they also take into account the many other needs that participants might put before their health-related goals. The care coordination staff are encouraged to meet participants "where they are" and to address the foremost concerns of the family rather than focusing solely on health-related needs.

> "Growing up in these communities where I am working now, there was never anything like this. I can even say I would have benefited greatly from a lot of these programs in terms of my own personal health problems and my own personal situations. I think CHECK is such a great program because the neighborhoods where we work are often medical barren lands."
>
> *— Care coordination staff member*

Second, respondents also indicated that the program is designed to build on the personal experience of the care coordination team members. The care coordination component of the program organizes participants by location, and a team is assigned to each neighborhood in that target area. Many community health workers on the teams are from the neighborhoods they are assigned to serve. They reported that this gives them greater insight into the significant and complex needs of program participants, which enables them to both inform program leaders about those needs and build strong relationships with participants.

2. Implementation processes

> "The last year has been a journey to becoming fully operational. And what we've really figured out is what each person's role really is here and how they work together and what the processes are that we need to make it work every day."
>
> *— Program leader*

Program staff and leaders reported that there are three primary facilitators in the implementation process: (1) program leaders who became more engaged with care coordination staff, (2) the gradual deployment of supportive telemedicine tools, (3) an increase in the use of feedback from frontline staff in decision making, and (4) successful engagement with community partners. First, respondents said that CHECK program leaders improved their engagement with care coordination staff, clarifying roles and providing additional training, which in turn improved staff's ability to engage participants in services. Respondents also noted that the University of Illinois took several approaches to improving the engagement and functioning of the care coordination teams. The new director of care coordination worked with program leaders and care coordination staff to clarify the team members' roles and responsibilities and to develop and implement protocols to guide each aspect of the care coordination work. For example, the director of care coordination created formal written protocols describing the process for conducting home visits and for following up with participants who are admitted to the hospital or to an ED. Program leaders also changed the structure and staffing of the care coordination teams. This included promoting some community health workers to the care coordinator position in order to improve the ratio of community health workers to care coordinator. Hiring care coordinators from within the existing community health worker staff also allowed care coordination teams to benefit from these staff's knowledge of and experience with the program. In addition to protocol development and team restructuring, the care coordination staff reported that program leaders prioritized supervisory support and training for the community health workers, which, according to respondents, helped to improve the community health workers' morale and effectiveness.

Second, CHECK program staff introduced new technologies designed to support care coordination services and to better meet participants' needs. Care coordination staff agreed that the SMS-based messaging system has been particularly helpful for communicating with participants and their families, noting that many of them strongly prefer communicating by text as opposed to phone or email. Care coordination staff also noted the advantages of the program's new virtual home visit platform, a Skype-like technology that allows care coordination staff to interact face-to-face with participants who do not have access to transportation or who would benefit from this type of contact with program staff. Finally, through a partnership with a community organization, program staff will ride along on a mobile dental van to targeted neighborhoods. Having found that many beneficiaries in the target population do not have access to basic dental care, program staff believe that the dental van facilitates engagement with these families.

Third, program leaders reported that they have concentrated more heavily on soliciting feedback from frontline staff, which helped them to further adjust program protocols and policies in Year 2. Several program leaders were trained in Lean Six Sigma performance improvement methodology, and they incorporated the lessons learned about feedback and transparency into CHECK. For example, care coordination staff noted that program leaders invited them to make

suggestions and comments on a bulletin board in a common area in the CHECK offices. Both program leaders and frontline staff reported that this input helped to make the program more responsive to the needs of staff, participants, and partner clinics.

Fourth, respondents noted that the University of Illinois has established strong relationships with partnering community- and school-based health centers even though many of these partners continue to operate their own care coordination programs. Respondents attributed this accomplishment to the fact that program staff have shown how CHECK can complement the health centers' care coordination programs by providing additional coordination of community and social services. For instance, community health workers began working at some partner clinics, which allowed them to (1) connect with CHECK participants in a convenient location before or after their medical appointments and (2) collaborate with clinic staff to promote the program and encourage new referrals. Program staff also reported that community health workers collaborate with the program leaders who are responsible for community engagement. The goal is to adapt the community health workers' approach to the needs of each partnering clinic. Program leaders who focus on community engagement work with liaisons, or "champions," at each site to identify the sites' needs and the ways in which CHECK's community health workers can be most useful.

> "When we embed the community health workers at these sites, we leave their interaction and how often they're going to be there up to the site itself because every site is different. We continuously modify [our work with sites] and continuously interact with our liaisons to find out if they have any challenges, questions regarding implementation, or suggestions for improvement."
>
> *— Program leader*

According to respondents, the program's care coordination software is the primary barrier in the implementation process. Although it has been easier to use this software for tracking participant's information and their contact with the program over the past year, program leaders have struggled to extract and make use of the data for program improvement and evaluation. For example, program leaders reported that the data they received from the software vendor does not have a codebook, making the data "basically meaningless." Respondents attribute this challenge to turnover in the vendor's staff and to inadequate planning before the software was developed. Program leaders have been considering several options to address this challenge. For instance, University of Illinois staff could work directly with the vendor in its office to solve the problem, or the awardee could contract with a different vendor to build care coordination software that better meets the program's needs. Program leaders plan to discuss these options with other organizations that use similar software.

3. Organizational and external context

The organizational and external context in which the CHECK program operates has facilitated and impeded implementation in several ways. Strong leadership continued to have a positive effect on implementation in Year 2. Many respondents noted that the program director played a critical role in successfully engaging both staff and partners in CHECK. Care coordination staff appreciated being included in conversations with program leaders about high-level issues such as sustainability and strategic outreach. Program leaders also believe that the program director was instrumental in executing and reinforcing complex partnerships, including the relationship with the state Medicaid agency, MCOs, and partnering community health

centers. According to respondents, new program leaders drove the changes that were necessary to improving implementation. For example, the new director of mental health promotion (promoted from within the mental health team) focused more on improving operations and practice than on research and theory. This shift helped to shape the team's operations more definitively and improved collaboration between the mental health and care coordination teams. The new director of care coordination played a similar role by establishing protocols and procedures to guide the team's work and to more fully engage the staff in program operations.

Despite these gains in program implementation, the university's institutional policies and requirements continued to impede implementation with respect to executing contracts, formalizing partnerships, and hiring program staff. For example, in negotiating contracts with MCOs or clinics outside the university's network, CHECK program leaders had to follow the procedures required of public entities within Illinois. As a result, the contracting process was significantly more time-consuming than anticipated. For example, the university system does not permit licensed, master's level mental health counselors to deliver clinical mental health services. CHECK program leaders initially attempted to work with the university to mitigate this challenge, but they ultimately decided to hire licensed clinical social workers (LCSWs), whom the university does allow to provide clinical mental health services. As of August 2016, the awardee had hired one LCSW and planned to hire at least one more.

CHECK program staff reported that one external factor has been a primary barrier to program implementation: the state's transition to a mandatory managed care model for Medicaid. This transition has made it more difficult for the awardee to develop relationships with, and to obtain data from, MCOs, in part because these organizations are developing internal care coordination systems of their own. The managed care model also continued to challenge care coordination staff because referrals to some health and mental health providers are restricted by differences in insurance coverage. For example, it has become increasingly difficult for community health workers to refer patients to mental health providers in the community because these providers may not accept all Medicaid MCOs. Participants can also change managed care plans each month, which can make it difficult for staff to determine, during the outreach process, whether a participant is eligible for the program.

Program leaders acknowledged, however, that the shift to Medicaid managed care has also facilitated implementation in some ways. It brought attention to the importance of care coordination, making potential partners more receptive to the CHECK program. In addition, more MCOs have implemented some kind of care coordination for their Medicaid enrollees, giving rise to the need for system-wide collaboration.

C. Development of the payment model

The University of Illinois did not change its payment model plans in Year 2. Program leaders plan to offer MCOs the option of using some or all components of the CHECK program (care coordination, technology, and mental health promotion, and early intervention). A PBPM fee for

> "I think we've laid a lot of the ground work for future financial partnering with our managed care partners, and now this last year [of the award] can really be about building on that and figuring out the details of what that looks like."
>
> *— Program leader*

each component is expected to sustain the program beyond the cooperative agreement. In addition, mental health services provided by LCSWs may be sustained through FFS payments. Respondents pointed to several factors that are likely to influence payment model development. CHECK program leaders highlighted their existing and growing relationships with managed care plans as a promising facilitator of the payment model. In addition, program leaders established a formal relationship with an actuarial firm (Milliman) for the purpose of evaluating and pricing CHECK's components for establishing a payment model. After inquiring about Milliman's services, the awardee learned that it has a business associates' agreement with the firm, allowing the organizations to move directly to developing a data sharing agreement. Milliman will collaborate closely with the CHECK program's outcomes and evaluation team to determine the best approach to the payment model. However, program leaders noted that their ability to make progress on the model may be hindered by the challenge of extracting data from the care coordination software to identify the number and types of care coordination activities each participant received.

IV. FINDINGS FROM THE ANALYSIS OF MEDICAID FFS AND MANAGED CARE ENROLLMENT AND CLAIMS DATA

The CHECK program facilitates care coordination for children and adults younger than the age of 26 with complex medical needs. The CHECK program is expected to reduce hospitalizations and emergency department (ED) visits and costs, reduce missed school days, and increase family engagement in the care process. The program mostly recruits patients from Medicaid managed care organizations (MCOs) that have agreed to work with the CHECK program. In this section, we provide a summary and a description of the baseline demographics, the chronic conditions, and the health service use characteristics of Medicaid beneficiaries who enrolled in the CHECK program.

For the purpose of our impact evaluation, we are pursuing a two-arm design: one relying on an experimental design involving randomization of eligible children to treatment and control groups, and one using a comparison group design. We describe the children in both arms in this report. For both arms, the patients included in the study are primarily children who were enrolled in one of the MCOs that CHECK contracted with and who have claims indicating that they had received treatment in the year prior to enrollment in the study for one or more of the following conditions: (1) diabetes, (2) sickle cell disease, (3) asthma, (4) prematurity, (5) brain injury, and (6) seizures or epilepsy.

In the comparison group design, the treatment group consists of eligible Medicaid children who were enrolled in one of the CHECK-affiliated MCOs or in Medicaid fee-for-service (FFS) and who were identified prior to the start of randomization. Once these eligible children were identified in the claims data, CHECK staff "enrolled" them in the study by sending an invitation letter to their families, and subsequently "engaged" them by initiating an assessment via phone or in person. Using information from this assessment, CHECK staff subsequently "activated" the engaged beneficiaries by providing them with CHECK-specific services. There were a total of 11,147 non-randomized enrollees in the CHECK program as of September 30, 2016, of which 7,279 (65.3 percent) were enrolled but not engaged (that is, contacted but not assessed); 426 (3.8 percent) were engaged but not activated (that is, assessed but not receiving services yet); and 3,442 (30.9 percent) were activated (Table 2).

Under the experimental design, included beneficiaries are eligible children and adolescents enrolled in a CHECK-affiliated Medicaid managed care plan as of the randomization date. The experimental design was jointly developed by CMS; Mathematica; the CHECK program; and the awardee's partner MCO, Harmony Health Insurance Plan. Mathematica randomized each eligible patient at Harmony (or other MCOs) participating in the study to either the treatment or the control group on April 11, 2016. The study sample eligibles who were assigned to the treatment group will follow the same gradual enrollment-engagement-activation procedure that is applied to non-randomized treatment beneficiaries. Eligible patients randomly assigned to the control group will not receive CHECK services, but will receive usual care from their MCO.

A. Baseline characteristics of the treatment group: Medicaid FFS and managed care beneficiaries

A total of 6,259 Medicaid-eligible children in Harmony were included in the randomized sample. Mathematica randomly assigned 3,128 of these beneficiaries to the control group and 3,131 to the treatment group by using a randomization procedure that was stratified by the beneficiary's risk tier. CHECK staff expect that there will be an attrition rate of approximately 30 percent (mostly due to hard-to-reach beneficiaries), which implies that approximately 2,192 beneficiaries will be engaged and available for subsequent activation. As of August 31, 2016, of the 3,131 randomized treatment beneficiaries, 2,395 (76.5 percent) were enrolled but not engaged; 65 (2.1 percent) were engaged but not activated; and 671 (21.4 percent) were activated (Table 2).

The baseline period for the analyses covers the 365 days before enrollment[7] for the non-randomized sample and up to 365 days before the date of randomization (April 11, 2016) for the randomized sample. After we excluded beneficiaries who did not meet the CHECK program's eligibility criteria as well as those who died, those who were incarcerated, or those who had moved out of state, a total of 17,406 beneficiaries (14,278 enrollees and 3,128 randomized control group members) were included in the analysis of baseline characteristics for this report.

Our examination of baseline characteristics in Tables 2 and 3 addresses several questions for the randomized and non-randomized samples:

- What are the characteristics of all enrollees?
- What are the characteristics of the randomized sample, and are the treatment and control groups similar?
- How do the characteristics of the non-randomized enrollees compare to those of the randomized control group (to assess the possibility of using the randomized control group as a comparison group for the non-randomized enrollees)?
- How do the three groups of CHECK participants differ: (1) enrolled but not engaged, (2) engaged but not activated, and (3) activated?

The Medicaid enrollees participating in the CHECK program comprise a diverse group on demographic and health status characteristics. About 56 percent of beneficiaries are children under the age of 12, while 44 percent are teenagers and young adults between the ages of 12 and 25 (last column, Table 2). Our race and ethnicity information is only available for the engaged and activated subsamples. Over 51 percent of the activated enrollees in the non-randomized sample reported being black or African American; over 33 percent of enrollees in the sample had no information regarding race or ethnicity (don't know, refused, or missing); and 14.3 percent reported being white or some other non-black race.

[7] The baseline period defined here is equal to 365 days prior to enrollment for all enrollees except those who were not enrolled in Medicaid for the full year prior to entering the CHECK program. For those enrollees, the baseline data cover the period from enrollment in Medicaid to enrollment in the CHECK program (annualized).

Asthma is by far the most common condition of enrollees, with 81 percent of enrollees having this condition (Table 3)—a much higher rate than the national prevalence rate of 9.4 percent in 2010–2012. This reflects the CHECK program's intended strategy of selecting asthmatic children with poorly controlled asthma, challenges with asthma medications, and an overall difficulty with asthma disease management.

The conditions are divided into four primary and two secondary chronic conditions, representing the CHECK program's initial target population (those with the primary conditions) and the additional (or secondary) conditions that were added later. Anyone with two or more of these six conditions is assigned to the "comorbidity" cell. Fewer than 6 percent of the sample fell into any of the other primary or secondary condition categories. Diabetes prevalence in the CHECK program is 5.5 percent—that is, over 20 times the national diabetes prevalence rate of 0.26 percent found in people younger than age 20 in 2012. CHECK beneficiaries have about the same incidence of sickle cell disease as all infants in the United States (1.5 percent in the CHECK program versus 1.6 percent nationally in 2010). The prematurity rate is low compared to the national rate, with 5.0 percent of CHECK beneficiaries diagnosed as premature, compared to 9.57 percent nationally. Looking at the CHECK program's secondary chronic conditions, individuals with a brain injury diagnosis comprise 0.5 percent of CHECK beneficiaries, a prevalence somewhat higher than the national prevalence of 0.3 percent. The seizure or epilepsy prevalence among CHECK beneficiaries is 2.6 percent—that is, two to three times the national seizure or epilepsy prevalence rate of 1.02 percent found in children under the age of 18. About 2.6 percent of all CHECK beneficiaries (that is, 418 individuals) had two or more of the above chronic conditions.

Table 2. Demographic characteristics of CHECK participants by type of sample (randomized and non-randomized) and treatment status

		Randomized treatment group				Non-randomized participants				Total participants (including randomized and non-randomized beneficiaries, but excluding control group)
	Randomized control group	All enrolled	Enrolled but not engaged	Enrolled and engaged but not activated	Enrolled and activated	All enrolled	Enrolled but not engaged	Enrolled and engaged but not activated	Enrolled and activated	
Total number of enrollees[a]	3,128	3,131	2,395	65	671	11,147	7,279	426	3,442	14,278
Age group										
< 9	38.2	38.5	37.8	46.2	40.4	43.6	42.3	54.2	45.1	42.5
9–11	15.1	15.5	15.1	18.5	16.7	12.4	11.2	12.9	14.9	13.1
12–18	31.4	31.0	30.4	24.6	34.1	30.5	31.9	21.4	28.4	30.6
>18	15.3	14.9	16.7	10.8	8.8	13.5	14.6	11.5	11.5	13.8
Gender										
Male	53.3	53.4	52.7	61.5	55.4	47.6	47.8	45.8	47.2	48.9
Female	46.7	46.6	47.4	38.5	44.6	52.4	52.2	54.2	52.8	51.2
Race										
Black or African American	NA	NA	NA	40.0	39.6	NA	NA	60.8	51.6	NA
All others	NA	NA	NA	7.7	15.4	NA	NA	11.7	14.5	NA
Don't know, refused, missing	NA	NA	NA	52.3	45.0	NA	NA	27.5	33.9	NA

[a]The sample includes beneficiaries with enrollment dates on or before September 30, 2016. The sample excludes all those who (1) were ineligible; (2) were deceased or incarcerated, or had moved out of state; and (3) those with no chronic condition or randomization flag in the finder file.

[b]Race information is only available for the engaged and activated samples.

Table 3. Health and service utilization characteristics of CHECK participants by treatment status[a]

		Randomized treatment group[b,c]				Non-randomized beneficiaries[b,c]				Total participants (including randomized and non-randomized beneficiaries, but excluding control group)
	Randomized control group	All enrolled	Enrolled but not engaged	Enrolled and engaged but not activated	Enrolled and activated	All enrolled	Enrolled but not engaged	Enrolled and engaged but not activated	Enrolled and activated	
Sample (N)	3,128	3,131	2,395	65	671	11,147	7,279	426	3,442	14,278
FFS enrollees[d]		29.7	31.5	32.3	23.1	21.9	19.1	33.3	26.5	23.6
Diagnosis flags from finder/randomization file (%)										
Primary chronic conditions										
Asthma	84.8	84.8	85.1	75.4	84.7	80.1	80.2	83.1	79.6	81.1
Diabetes	4.7	5.0	5.2	7.7	3.9	5.7	5.8	3.5	5.8	5.5
Sickle cell disease	0.6	0.6	0.6	3.1	0.5	1.8	1.2	2.8	2.7	1.5
Prematurity	4.3	4.1	4.0	6.2	4.3	5.5	5.7	5.6	4.9	5.2
Brain injury	0.1	0.3	0.3	1.5	0.3	0.6	0.8	0.0	0.2	0.5
Seizure	3.3	3.6	3.4	4.6	4.2	3.5	3.7	2.1	3.3	3.5
Comorbidity										
Two or more of above conditions	2.1	1.6	1.4	1.5	2.2	2.9	2.6	2.8	3.5	2.6
Hospitalization (%)	5.2	4.8	5.1	1.5	4.2	7.7	6.3	11.5	10.2	7.1
ED visit (%)	30.0	30.1	30.6	24.6	28.6	31.6	25.6	51.4	41.9	31.3

[a]None of the measures in this table are weighted by the length of the beneficiaries' enrollment in Medicaid because we do not have Medicaid enrollment data.

[b]For randomized treatment and control groups, the baseline period is 365 days prior to the randomization date (April 11, 2016). For the non-randomized group, the baseline period is 365 days prior to September 30, 2016.

[c]Excludes (1) all ineligible records; (2) beneficiaries who were deceased, incarcerated, or who had moved out of state; and (3) those with no chronic condition or randomization flag in the finder file.

[d]Percentage of FFS enrollees in finder file. Data not available for randomized control group.

ED = emergency department

As expected, the mean characteristics for the randomized control and treatment groups were nearly identical for all diagnosis categories, hospitalization rates, and ED visit rates, which corroborates that our randomized intervention groups are comparable. For example, 85 percent of both groups have asthma, 5 percent had a hospitalization in the past year, and 30 percent had an ED visit. We also compared the randomized control group to the non-randomized enrollees to assess whether the randomized control group might be modified to serve as a comparison group for the non-randomized enrollees. The distribution of chronic conditions across the two groups was fairly similar, with asthma being the most common condition (affecting 80 percent of non-randomized enrollees and 85 percent of the randomized control group) followed by diabetes (affecting 5 percent to 6 percent of each group). Compared to the randomized control group, the non-randomized enrollees were more likely to be hospitalized (7.1 percent versus 5.2 percent) and slightly more likely to have an ED visit (31.3 percent versus 30.0 percent). As stated above, we will continue to monitor the differences between the randomized control group and the non-randomized enrollees to explore whether we can modify the randomized control group to serve as the comparison group for the non-randomized enrollees, because there are differences on some factors that could distort the estimated differences in outcomes in our impact analyses.

The characteristics of activated beneficiaries suggest that healthier individuals were activated in the randomized group and less healthy individuals were activated in the non-randomized group. Activated randomized beneficiaries were less likely to have been hospitalized (4.2 percent versus 5.1 percent) and less likely to have ED visits (28.6 percent versus 30.6 percent) than those who were only enrolled (but not yet engaged or activated) in the CHECK program. Conversely, within the non-randomized group, activated beneficiaries were substantially more likely to be hospitalized than those who were enrolled but not engaged in the CHECK program (10.2 percent versus 6.3 percent, respectively) and much more likely to have an ED visit (41.9 percent versus 25.6 percent, respectively). These opposite patterns between treatment statuses in the randomized and non-randomized samples should be interpreted with caution, however, given that the implementation of the CHECK program on the randomized sample is in its early stages.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: University of Illinois

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	16,000
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,649
Likelihood of all-cause hospitalizations	1,355
MDE sample size requirement to detect 20% effect	
Total expenditures	412
Likelihood of all-cause hospitalizations	339
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	No serious issues; proceeding with comparison group selection
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Possible data on use of care coordination services

DDB = difference-in-differences Bayesian

We will be able to conduct a rigorous impact analysis by comparing the randomly assigned treatment group to the randomly assigned control group. We will also explore possibilities for selecting a comparison group of beneficiaries for participants who were not randomly assigned. We have a sufficient sample of participants to be able to detect plausible effects on claims-based measures.

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V. NEXT STEPS

A. Implementation evaluation

As the University of Illinois enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

We will move forward with estimating impacts using the randomized treatment and comparison groups as soon as we can observe a six-month follow-up period for CHECK participants in the Medicaid claims data. We will also determine the feasibility of generating a matched comparison group for CHECK participants who are not part of the randomized sample. The matched comparison group could possibly be selected from randomized control participants, or may need to be drawn from beneficiaries outside of Cook County, Illinois, where the CHECK program is being delivered. We will provide a description and discussion of these findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered care coordinators, community health workers, mental health promotion staff, health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, which is scheduled to be launched in May 2017.

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VI. TECHNICAL APPENDIX

This technical appendix explains how we constructed common baseline sociodemographic characteristics as well as baseline utilization and diagnosis measures from Medicaid claims and enrollment data for the Board of Trustees of the University of Illinois, Chicago.

Section A describes the input data received from the awardee. Section B describes how we defined enrollment, which is the starting point for a participant's baseline year. Section B also describes the criteria we used to determine whether participants were eligible for our analysis. Section C describes the demographic characteristics in Table 2 of the quarterly report. Section D describes the baseline diagnosis and utilization measures in Table 3 of the report.

A. Input data

There were two files that defined the population for the Coordination of Health Care for Complex Kids (CHECK) program. The finder file consisted of all beneficiaries (regardless of whether or not they were activated) from the non-randomized sample, the randomized treatment group, and the comparison group. The randomization file consisted of beneficiaries who were randomly assigned to either the treatment or the control group in this study. Both of these files contained sociodemographic information, enrollment information, and diagnostic condition flags. In addition, the awardee sent an assessment file that contained information about which beneficiaries in the program were engaged and activated as well as other demographic information about the beneficiaries such as race. Finally, there was a series of claims data. The following three claims data sets were used in the analysis for this report:

1. Main claims data
2. Diagnoses data
3. Revenue codes data

Additional claims data obtained from the awardee included claims information for all beneficiaries involved in the program organized into separate files: CPT procedure codes, an institutional file, pharmacy claims, a Non-Institutional Provider Services (NIPS) file, a payment adjustment file, an immunization file, and a lead testing file.

B. Definition of enrollment

For the CHECK program, the enrollment date is defined as the date a contact letter was sent to the prospective beneficiary. For the analysis in this report, we included beneficiaries who were enrolled into the program on or before September 30, 2016. This cutoff date was chosen because we did not receive enough claims for the subsequent period (that is, not enough claims run-out time).

The baseline year is the 365 days before each participant's enrollment date for the non-randomized sample and 365 days before the date of randomization (April 11, 2016) for the randomized sample.

We included beneficiaries in the analysis if they were eligible and not dis-enrolled. Beneficiaries were excluded from the analysis if they had flags in the finder file or the randomization file that indicated the following:

- They were ineligible.
- They were deceased or incarcerated, or had moved out of state.
- They had no chronic condition flags (asthma, sickle cell disease, epilepsy, diabetes, prematurity, or newborn brain injury).

C. Sociodemographic characteristics

Table 2 of the report shows the total number of enrollees in each of the three groups: (1) the randomized control group (coming from the randomization file), (2) the randomized treatment group (coming from the randomization file), and (3) the non-randomized participants (coming from the finder file). In the very few instances in which a person was depicted in both the randomization file and the finder file, we used the sociodemographic and chronic condition information from the randomization file. Age was constructed to be the randomization date (April 11, 2016) minus the beneficiary's birth date from the randomization file for those individuals with a birth date in the randomization file. Otherwise, age was equal to the date the enrollment letter was mailed minus the beneficiary's birth date from the finder file. Gender was defined as the value of gender from the randomization file. If the beneficiary was not in the randomization file, we used the gender data from the finder file. Race was determined by merging all beneficiaries to the assessment file and using the race information from that file for each beneficiary (although, race information was only available for engaged and activated beneficiaries). If the beneficiary was not included in the assessment file, the race variable was set to "missing/don't know."

D. Baseline condition and utilization variables and outcomes

The condition categories shown in Table 3 of the report are taken from the condition flags in the randomization file and in the finder file. As with the sociodemographic information, if a person was included in both the randomization file and the finder file, we used the condition flag information from the randomization file.

Hospitalizations were constructed using data from the main claims file. We excluded rejected claims (REJECTIONSTATUSCD = Y) and Medicare claims (RecordIDcd = M). We defined hospitalizations as RecordIDcd = I (UB92 Inpatient Record) or CatgofServiceCd = 20, 21, 22, 23.

Emergency department (ED) visits were constructed using the revenue center codes file. We first excluded line items from the revenue code file that indicated a rejected claim (REJECTIONSTATUSCD = Y). ED visits were defined as line items with one of the following values for RevenuCd:

- 450 EMERGENCY ROOM (78)
- 451 ER/EMTALA (88)

- 452 ER BEYOND EMTALA SCREENING
- 456 EMERGENCY ROOM/URGENT CARE (85)
- 459 OTHER EMERGENCY ROOM
- 981 PROFESSIONAL FEES/EMERGENCY ROOM

The ED line items were merged to the claims file (using the DCN field in the data). The claims were then subset to claims with a "service through" date within 365 days before each beneficiary's enrollment date.

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APPENDIX B.33.

REGENTS OF THE UNIVERSITY OF MICHIGAN

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REPORT

APPENDIX B.33

HCIA Round Two Evaluation: Regents of the University of Michigan

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Michigan Surgical and Health Optimization Program (MSHOP) from the Regents of the University of Michigan, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the University of Michigan's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of Michigan made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the University of Michigan addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the University of Michigan's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the MSHOP (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

University of Michigan is using funding from HCIA R2 to expand MSHOP. The University of Michigan Health System (UMHS), an academic medical center, began implementing the MSHOP in 2011. The University of Michigan is expanding the program to 39 other sites under the HCIA R2 award, which began on September 15, 2014. The program targets adult individuals at participating surgical practices who (1) are scheduled for a major abdominal or a select general surgery, (2) are at high risk for poor surgical outcomes (as identified through the screening process described below), and (3) have at least a one-week interval between MSHOP enrollment and their surgery date. Through the MSHOP, surgeons and their staff use a tool on a mobile device or laptop to assess participants' risks for poor outcomes from surgery. The tool is used at the point of referral or during a surgical consult for a major abdominal or select general surgery. If the patient exceeds the threshold risk level or the surgeon feels that the patient is at high risk despite the risk score, the patient is asked to participate in a "prehabilitation" program. Participants have the option of receiving a daily, automated telephone call or text or a weekly email that prompts them to report on their prehabilitation activities, such as the number of steps walked per day. Surgeons and staff use these data to monitor patients and to determine what guidance and encouragement to give them. Program leaders originally hoped to provide prehabilitation services to 12,500 participants by the end of the three-year cooperative agreement, but in Year 2 they revised the target enrollment goal down, first to 5,243 participants and later to 2,500.[2] The University of Michigan's goals for its target population are to reduce (1) the length of inpatient hospital stays by 2.3 days per surgical case, from a mean of 5.6 days for all surgical discharges; (2) 30-day, postoperative cost of care payments by 9 percent, or $2,561 per surgical case; and (3) surgical complications by 10 percent. Program leaders are developing a payment model for Medicare and Medicaid. They are also implementing incentive payments for participating sites for the duration of the cooperative agreement (Table 1).

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified the following successes achieved by the University of Michigan during the first year of its cooperative agreement:

- The awardee enrolled 561 participants in the MSHOP, with 548 of them at its UMHS site. In addition, the awardee had recruited the targeted number of three hospitals for its first year and appeared to be ahead of its initial goal to recruit ten additional hospitals in the second year.
- Program staff reported that they believed in the value of prehabilitation to improve quality of care and found the program easy to understand.

[2] Information about revising the three-year enrollment target to 2,500 participants was obtained in September 2016 through correspondence with the grantee.

We also identified the following challenges in implementing the MSHOP and the University of Michigan's strategy for addressing them:

- Participant enrollment at sites other than UMHS was far below initial expectations. Ongoing challenges included difficulty with securing effective surgeon leadership at practices, introducing new workflows at the practices, and changing surgeons' habits.
- To address these challenges, the awardee allowed variation in implementation across sites and created a pilot program within the MSHOP. Under the pilot, which was implemented at a single site, surgeons did not use the risk assessment tool and the definition of an eligible participant was expanded beyond the original 13 types of abdominal surgery to all general surgery patients. The MSHOP was implemented concurrently at all other participating sites without these modifications.

Finally, we identified the following lessons learned by the University of Michigan in implementing its MSHOP program:

- Program leaders learned that it takes significant time to recruit hospitals to participate and complete the necessary institutional review board (IRB) and data use agreements (DUA). They were trying to recruit all 40 hospitals by the end of Year 2, rather than the earlier goal of recruiting 40 hospitals by Year 3.
- Program leaders learned that they needed to tailor workflow changes to individual practices' and hospitals' needs and circumstances.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of Michigan made progress in the following areas:

- MSHOP leaders are spending more face-to-face time with practice staff to understand implementation challenges.
- MSHOP leaders refined their messaging to address continued feedback from surgeons and staff that implementing the MSHOP competes with other quality initiatives and that resources are scarce.

Over the past year, the University of Michigan also made several changes to its MSHOP program:

- Program leaders revised their three-year enrollment target from 12,500 participants to 2,500 participants. They also revised their site recruitment target to focus on the recruitment of practices instead of hospitals. Their new goal is to recruit 40 practices, regardless of the number of hospitals represented. This change will allow MSHOP leaders to focus on recruiting practices within hospitals that already have the necessary DUAs and IRB approvals in place. This revision was made in response to delays in securing DUAs and IRB approvals for hospitals newly joining the MSHOP.

- Program leaders expanded the eligibility criteria beyond the 13 abdominal surgeries (represented by 73 common procedural terminology [CPT] codes) identified in the original application to include all major abdominal surgeries (represented by 292 CPT codes).[3] The final list of procedure codes does not include most thoracic, urological, and vascular surgeries that were briefly included in the eligibility criteria in April, May, and part of June 2016. (However, a few of the major procedures with an abdominal approach are still included.) Program leaders also began to include patients with at least one week between their enrollment and scheduled surgery date, instead of the original minimum interval of two weeks.

Below we note the key challenges that the University of Michigan has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Program leaders responded to challenges with recruiting practice sites and lower-than-expected enrollment. Despite revisions to the site recruitment goal and expansion of the eligibility criteria, the awardee continues to encounter difficulties reaching site recruitment and participant enrollment goals.

As the University of Michigan enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Clinicians and practice staff continue to express program buy-in, reporting that they believe in the value of prehabilitation to improve quality of care. They also describe MSHOP leaders as highly accessible and responsive.
- MSHOP leaders report that the focus on recruiting practices from already-participating hospitals is effective at helping them recruit new practices to the program. However, they are experiencing difficulty recruiting new practices because the three-year cooperative agreement is almost over.
- Despite the expanded participant eligibility criteria, program staff believe the criteria is too limited for successful implementation at participating practices.
- MSHOP leaders are in early discussions with Blue Cross Blue Shield of Michigan to develop a payment model proposal to share with CMS. Some participating practices report that their future participation in the MSHOP depends upon insurers covering the costs of the program.

[3] Information about revising the number of CPT codes in the eligibility criteria to 292 codes was obtained in September 2016 through correspondence with the grantee.

Table 1. University of Michigan: MSHOP characteristics at a glance

Program characteristic	Description
Purpose	Surgeons and their teams use a web-based tool on mobile devices or computers at the point of referral or surgical consult for an abdominal or a select general surgery to assess participants' risks for poor outcomes and, if medically appropriate, to engage them in a prehabilitation program.
Components	Quality improvement and process redesign, health information technology, and patient and family engagement
Target population	Individuals at participating practices who meet the following criteria: • Scheduled for a major abdominal or a select general surgery • Scored as high risk for poor surgical outcomes • Have at least one week between MSHOP enrollment and the surgery date
Theory of change/theory of action	The Regents of the University of Michigan (UMich) hypothesize that participation in the prehabilitation program will lead to fewer surgical complications and will reduce the length of inpatient hospital stays after surgery, both of which will lower costs.
Payment model	Value-based payments
Award amount	$6,389,850.00
Launch date[a]	September 15, 2014
Setting	Surgical practices
Market area	A mix of urban and suburban
Market location	MI
Core outcomes	UMich's goals for its target population are to reduce: • The length of inpatient hospital stays by 2.3 days per case • The payments to hospitals for inpatient cost of care by $2,561 per case • Surgical complications by 10 percent (These goals reflect the savings demonstrated at UMHS during a pilot of this program.)

[a]After a planning period, the awardee's program became operational as of this date.

MSHOP = Michigan Surgical and Health Optimization Program; UMHS = University of Michigan Health System

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of Michigan in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 22 through July 6, 2016. For the analyses of the University of Michigan's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- Five program leaders at the University of Michigan
- Seven frontline staff at six sites implementing the MSHOP

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[4] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the University of Michigan's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

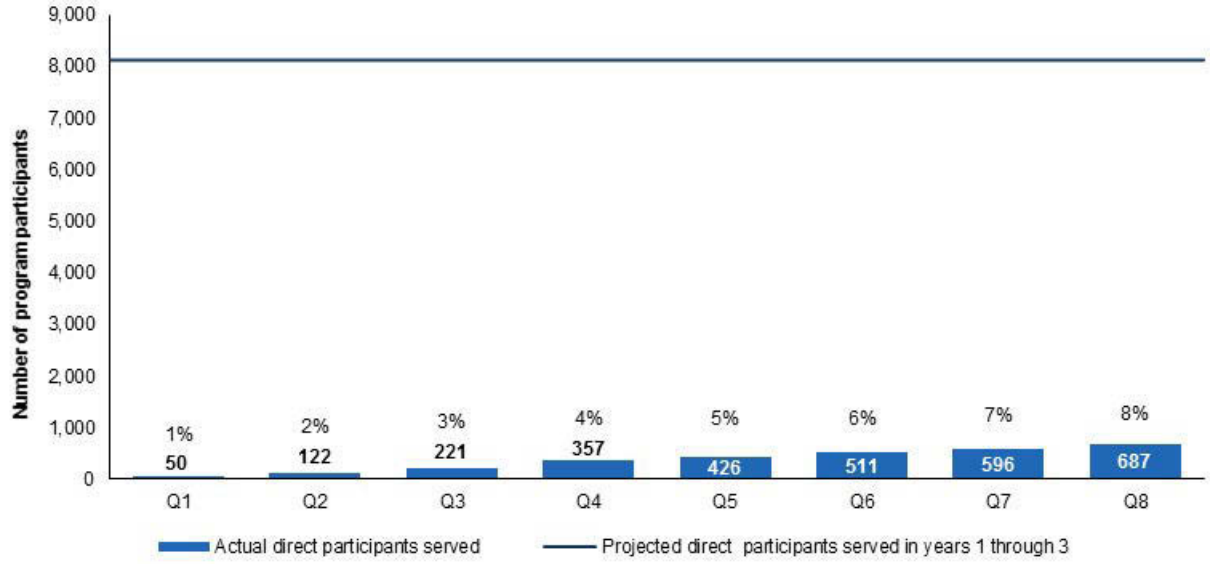
A. Program enrollment

Overall, the University of Michigan reported to the implementation and monitoring contractor that it directly served 687 participants from September 2014 (the launch of its program) through August 2016, which represents about 8 percent of its 8,125 projected direct participants (Figure 1). The University of Michigan also reported that it served 458 indirect

[4] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

participants from September 2014 through August 2016, which represents about 10 percent of its 4,375 projected indirect participants (Figure 2). These figures reflect the University of Michigan's original three-year enrollment target. During Year 2, program leaders revised their three-year enrollment target from 12,500 participants to 2,500 participants. The baseline characteristics of participants who we are able to identify in Medicare fee-for-service enrollment and claims data are presented in section IV.

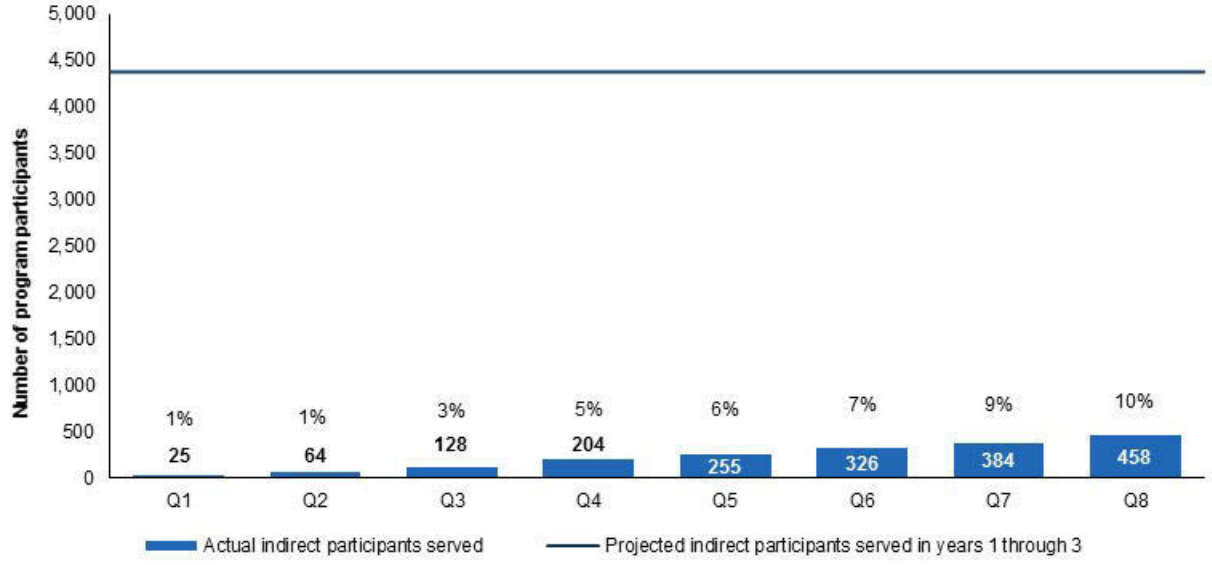
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have either Medicare or Medicaid as their primary insurer from program launch through the eighth program quarter. In August 2016, UMich lowered its three-year projected enrollment to 2,500 from 5,243 total served participants, including both direct and indirect. This figure reflects the original enrollment target of 8,125 direct participants served. Information about revising the three-year enrollment target to 2,500 participants was obtained in September 2016 through correspondence with the awardee.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to those participants who do not have either Medicare of Medicaid as their primary insurer from program launch through the eighth program quarter. Indirect participants do not receive the HCIA R2–funded patient education kit, which contains a pedometer, spirometer, and educational materials. In August 2016, UMich lowered its three-year projected enrollment to 2,500 from 5,243 total served participants, including both direct and indirect. This figure reflects the original enrollment target of 4,375 indirect participants served. Information about revising the three-year enrollment target to 2,500 participants was obtained in September 2016 through correspondence with the awardee.

The University of Michigan's progress in meeting its three-year enrollment goal was influenced by several factors. During Year 2 of the award, MSHOP leaders focused intensively on addressing low enrollment at participating practices. As reported in the first program narrative, participant enrollment has been far below initial expectations at all sites other than UMHS. MSHOP leaders reported that UMHS is enrolling approximately 10 patients each week, while the other sites enroll 1 patient every one to four weeks. Below we discuss the strategies MSHOP leaders used during Year 2 to address low enrollment.

- To investigate low program enrollment, MSHOP leaders designated one participating site to be a pilot site that implemented two modifications to the MSHOP: (1) participant eligibility criteria were expanded beyond the initial 13 abdominal surgeries to include all inpatient general surgeries, and (2) surgeons did not use the risk assessment tool, instead enrolling high risk patients at their discretion. MSHOP leaders intended to compare enrollment at the pilot site to enrollment at all other sites, which were not implementing these modifications, to see if the pilot site experienced a different rate of enrollment. However, the pilot site did not enroll enough patients for MSHOP leaders to gather relevant findings. Although the pilot was unsuccessful, MSHOP leaders allowed the site to continue using the two

modifications because of the site's low enrollment and the burden of retraining program staff.

- MSHOP leaders revised the target enrollment goal down twice from the original goal of 12,500 participants by the end of the three-year cooperative agreement. They first revised the enrollment goal to enroll 5,243 participants and later revised the goal to 2,500 participants over the three year period. MSHOP leaders reported that their original projection was based on data from the Michigan Surgical Quality Collaborative (MSQC)[5] on hospitals' surgical volumes, which were not analyzed at the level of detail necessary to make accurate enrollment projections. MSHOP leaders did not analyze the data at the practice level or omit patients whose surgeries were either outpatient procedures or scheduled less than two weeks in advance. MSHOP leaders based the new enrollment projection primarily on (1) average patient volumes over 12 months at UMHS, (2) estimates provided by participating sites, and (3) new analysis of MSQC data for future sites.
- MSHOP leaders expanded participant eligibility criteria beyond the 13 abdominal surgeries identified in the original application. MSHOP leaders revised the eligibility criteria three times in Year 2 of the award, first in April, then in June, and again in August 2016. The first revision, which was approved by CMS, expanded the eligibility criteria to include any major abdominal procedure as well as thoracic, urological, and vascular procedures. The expanded procedures were represented by 690 CPT codes—a significant expansion from the original 13 surgeries, which were represented by 73 CPT codes. MSHOP leaders worked with the software vendor, prenovo,[6] to modify the risk assessment tool to include the additional surgeries. In May 2016, MSHOP leaders announced the program modification to participating practices and retrained surgeons and staff. In June 2016, following concern from CMS that the program eligibility criteria had become too broad, MSHOP leaders again revised the criteria to 319 CPT codes. In August 2016, MSHOP leaders worked with CMS to revise the eligibility criteria to 292 CPT codes. While the criteria now include major abdominal or select general surgeries represented by 292 CPT codes—a greater number of surgeries than the 13 surgeries identified in the original application—the criteria no longer include most thoracic, urological, and vascular surgeries, though a few of the major procedures with an abdominal approach are still included. Although participant eligibility has been expanded, program staff believe the criteria are too limited for successful practice implementation. Program staff reported that most surgeons and practice staff tend to forget to recruit and enroll eligible patients into the MSHOP because it is not the standard of care for all patients. In addition, some program staff said that few of the surgeries that participating practices perform meet the criteria. For example, one physician champion said that limiting the eligibility criteria to inpatient surgeries means that the majority of his surgeries, which are outpatient surgeries, do not count toward the program, even with the newly expanded list.
- MSHOP leaders revised the eligibility criterion requiring that patients have a minimum two-week interval between program enrollment and surgery. Participating sites can now enroll patients who are one week from surgery. MSHOP leaders reported that, given the high

[5] For more information, please visit http://www.msqc.org/.

[6] For more information, please visit http://prenovo.com/.

volume of surgical patients at UMHS, many patients have elective surgeries scheduled four to six months from the time of MSHOP enrollment. Therefore, the requirement that patients have at least a two-week interval to participate in the MSHOP was never a challenge to enrollment at UMHS. However, at smaller hospitals, patients generally have surgeries less than two weeks after a surgical consult. There are two reasons for this: (1) smaller hospitals have lower surgical volumes and can accommodate surgeries fairly quickly after surgical consult, and (2) smaller hospitals have a financial incentive to perform surgeries as soon as possible. In response, MSHOP leaders changed the two-week interval criterion to a one-week interval criterion in an effort to make the MSHOP more relevant to smaller hospitals and boost enrollment. However, some program staff expressed concern that one week of MSHOP participation would not be enough time for the prehabilitation activities to have an effect. One nurse said that the MSHOP can increase patient engagement and decrease anxiety even after only a week.

- MSHOP leaders revised their site recruitment target from 40 hospitals to 40 practices, allowing them to focus on recruiting practices in hospitals that already have the necessary DUAs and IRB approvals in place. As reported in the first program narrative, MSHOP leaders learned that it takes more time than they had anticipated to recruit hospitals to participate in the MSHOP and to complete the necessary DUA and IRB paperwork. MSHOP leaders believe that recruiting 40 practices (as opposed to 40 hospitals) is a more realistic goal that will help them meet their target enrollment goal within the three years of the cooperative agreement.
- MSHOP leaders refined their program messaging to address continued feedback from surgeons and staff. Program leaders learned from MSHOP frontline staff that the program is often viewed as competing with other quality initiatives when time and staff capacity are scarce. To aid in practice recruitment and engagement efforts—and, in turn, boost enrollment—MSHOP leaders began emphasizing the importance of the MSHOP to patients' well-being and surgical outcomes. They created new communications materials outlining the MSHOP's benefits to surgical practices and patients.

Below we discuss the facilitators of and challenges to the strategies that MSHOP leaders used in Year 2 to address low enrollment. We also discuss the new strategy that MSHOP leaders plan to use in Year 3 to address enrollment challenges.

MSHOP leaders reported that the focus on recruiting practices in already-participating hospitals is an effective recruitment strategy. This "lateral spread" is effective for two reasons. First, MSHOP leaders reported that word-of-mouth about the MSHOP among practices in already-participating hospitals helps recruit new practices to the program. Surgeons tend to have more interest in the MSHOP when they hear their colleagues speak about their participation in the program, as opposed to when MSHOP leaders try to recruit them. Second, surgeons and staff at participating practices can suggest others whom they think MSHOP leaders should contact. One MSHOP leader said that this was significantly more efficient and effective than cold-calling hospital administrators to talk about the program.

MSHOP leaders remain connected to MSQC, as the state surgical quality collaborative meetings bring participating clinicians together and facilitate engagement in the MSHOP. Even though MSHOP leaders are focusing on recruiting practices in already-participating hospitals

and no longer rely on MSQC's network of surgeons to recruit new hospitals, they see MSQC meetings as a useful place to meet with surgeons and nurses from participating practices to talk about the program and maintain their engagement.

Program staff continue to express buy-in for the MSHOP, reporting that they believe in the value of prehabilitation to improve quality of care. A number of physician champions emphasized that the MSHOP is filling a need in perioperative care, using the terms "logical," "common sense," and "straightforward" to describe how the program fits into the perioperative care process.

> "It really makes sense, training people for surgery. It's such a major stress on the body. People are typically not ready for any type of exertional activity, so anything we can do to get them a little stronger before they go under anesthesia and surgery, it just makes logical sense."
>
> *— Physician champion*

Program staff noted that MSHOP participants valued the program for three reasons: (1) they like the patient tracker, which gives them the ability to track their prehabilitation activities; (2) MSHOP participation helps reduce their anxiety before surgery; and (3) MSHOP participation gives them a sense of satisfaction because they have taken responsibility for their health. One surgeon reported that nearly every patient who met the eligibility criteria without having to delay a surgery was willing to participate in the MSHOP.

MSHOP leaders are experiencing difficulty recruiting practices because the three-year cooperative agreement is almost over. As MSHOP leaders recruit new practices to participate in the program, they must inform practices that the cooperative agreement will end in August 2017. MSHOP leaders reported that practices are hesitant to join the program with a relatively close end date. As of May 31, 2016, a total of 17 surgical practices were actively participating in the MSHOP. MSHOP leaders reported that they had five additional practices that had completed the IRB process and that would start recruiting patients for the program between June and August 2016.

Despite MSHOP leaders' focused messaging to practices, the engagement of physician champions continues to vary. Some physician champions have actively promoted the MSHOP to ensure that the program is implemented into practice workflows, while other physician champions have struggled to make the MSHOP a priority. For example, one practice that agreed to participate in the MSHOP dropped out of the program without officially notifying MSHOP leaders.

Two MSHOP leaders attributed the difficulty in engaging surgeons to the nature of their work. They explained that because surgeons are often directly saving lives, they do not have the bandwidth or time to focus on the MSHOP.

> "[Surgeons'] time is expensive . . . and for them to take five minutes of their day once or twice a month to talk to us costs them money."
>
> *— MSHOP leader*

To address these challenges in Year 3, MSHOP leaders have begun instructing sites to enroll all patients who have a risk score of 50 or more and who have at least one week before their scheduled surgery. MSHOP leaders believe that integrating the program with practice workflow is most successful when the MSHOP is the standard of care for all patients in a practice.

B. Implementation of the service delivery model

The University of Michigan has made progress in implementing its service delivery model. The factors that facilitated or hindered implementation in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Clinicians and practice staff reiterated that they found the web-based tool helpful, but had different opinions on the MSHOP's most valuable program features. In the first program year, the web-based tool (which includes a risk assessment tool, patient tracker, and patient database) was not always reliable. As of July 2016, clinicians and practice staff reported that the web-based tool was easy to use and worked efficiently, describing several favorable features of the tool such as the patient tracker. The tracker can accrue patient data submitted by telephone or computer. The information in the MSHOP kit is also viewed as valuable, as it reinforces patients' accountability and responsibility for their health care.

Some program staff believe that adding additional features to the MSHOP will make the program more effective. Clinicians expressed the need to collect direct patient feedback on the program to figure out where improvements are needed. A couple practices collected their own data, which they later used to persuade some reluctant surgeons to try the MSHOP. In addition, one physician champion said that he would like to make the nutrition component of the program more substantive by including calorie tracking in the patient tracker. Another physician champion said that adding a care coordinator to the program would be beneficial because a care coordinator could be in contact with patients throughout the entire perioperative experience.

2. Implementation processes

MSHOP leaders are spending more face-to-face time with practice staff to better understand and address implementation challenges; they continue to allow variation in implementation at practices. As noted in the first program narrative, MSHOP leaders try not to dictate an exact workflow that practices must follow in implementing the program. Instead, they strive to

understand practices' workflows and help them implement the program in a way that works best for them. In Year 2, MSHOP leaders met with practices more frequently to help them figure out where MSHOP fit into their workflows. MSHOP leaders reported that focusing on the specifics of each practice's workflow enabled them to identify two ways in which the program could be strengthened. First, MSHOP leaders are planning to propose to CMS that University of Michigan staff conduct MSHOP enrollment for some participating practices that are struggling with integrating enrollment into their workflows. This modification is also intended to help reduce implementation burden on practices. Second, MSHOP leaders are considering the development of a participant video to explain the contents of the MSHOP kit. This would relieve practice staff of the burden of explaining the kit to patients.

MSHOP leaders had difficulty with reporting on their self-monitoring measures to examine program performance and assess program impact. MSHOP leaders attributed this difficulty to the length of time between patient enrollment and the practice's collection of certain data elements (for example, date of surgery and insurance type) that are required for analysis. MSHOP leaders also reported challenges with receiving data from participating hospitals in a timely manner. For example, MSHOP leaders ask hospitals for numeric patient identifiers after each surgery is completed, but MSHOP leaders reported that there was either resistance from hospitals to share this information or they could not get connected with a dedicated health information technology person for data sharing—despite having DUAs and business associate agreements in place. Although MSHOP leaders wanted to minimize the burden of data submission on practices, they have begun asking participating practices to submit this information as they feel this is the most reliable source for data.

> "We were trying to keep the data entry to an absolute minimum and make the enrollment process very quick and easy [for participating practices]. We didn't want to burden the patient enroller with a lot of extra fields that they had to fill out."
>
> *— MSHOP leader*

3. Organizational and external context

Program implementation can be influenced by individuals; by the structural, political, and cultural characteristics of the implementing organization; and by the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment in which the program operates.

Staff support for participating practices may be key to the uptake of and engagement in the MSHOP. For example, at one hospital with multiple participating practices, the hospital pays partial full-time equivalent (FTE) for the MSQC representative to work with the physician champion to recruit, train, and keep surgeons and staff engaged in the program. As a result of this support from hospital administration, approximately five practices in the hospital are participating in the program, and the physician champion expects to recruit several more before the end of the cooperative agreement. In addition, MSHOP leaders learned that providing FTE support to participating practices may yield more participation, as opposed to relying on volunteer effort.

MSHOP leaders are perceived as highly accessible and responsive. Clinicians and practice staff said that they received the proper amount of guidance and support from MSHOP leaders. They reported that MSHOP leaders were easy to reach and always responded to questions they

had about the program. They also mentioned having frequent email and telephone communication with MSHOP leaders, as well as MSHOP leaders' responsiveness to suggestions that they had to improve the program.

MSHOP leaders revised their staffing plans to accommodate for a longer-than-anticipated hiring process, which they attributed to the University of Michigan's hiring regulations. MSHOP leaders initially planned to have three clinical program liaisons to work with participating practices to implement the MSHOP. However, the hiring process for the second clinical program liaison took longer than anticipated for two reasons: (1) the University of Michigan requires all open grant-funded positions to be posted as term limited, which attracted a pool of candidates that MSHOP leaders did not believe were suited for the position and made it difficult and time-consuming to find a candidate that was the right fit, and (2) the University of Michigan's timeline for hiring (for example, an open job position must be posted for a specified period of time) takes several months. Given these reasons, MSHOP leaders decided not to hire a third clinical program liaison. Instead, they planned to revise the job duties of the program assessment lead, who works primarily on the incentive payment model, to help with the clinical program liaison duties.

C. Development of the payment model

Below we discuss the University of Michigan's progress in developing and implementing its payment model, as well as the facilitators of and challenges to implementing the incentive payment model for participating physician champions and practices.

MSHOP leaders are developing a payment model for Medicare and Medicaid. MSHOP leaders are in the early stages of discussions with Blue Cross Blue Shield of Michigan (BCBSM) to develop a payment model proposal to share with CMS. It will be based on a payment model being used by the Michigan Value Collaborative[7] at the University of Michigan, which also partners with BCBSM. MSHOP leaders are intending to set up a unified payment model (that is, the same payment method) for patients with Medicare, Medicaid, and commercial insurance.

MSHOP leaders also plan to provide incentive payments for the duration of the cooperative agreement to physician champions and surgical practice staff for their active participation in the program. MSHOP leaders made two changes to this incentive payment model in Year 2. First, they restructured the model to award payments at the practice level rather than the hospital level. Second, they lowered the potential incentive payment amounts per practice (while keeping the potential incentive amounts for the system stable) to account for the possibility that more than 40 practices will participate in the program by the end of the cooperative agreement.

Despite these changes, MSHOP leaders do not anticipate that any practice will receive the maximum available incentive payment because of the low enrollment numbers across the program. As of June 2016, no incentive payments had been made to practices. Three practices were due to receive incentive payments at that time, but the incentive payments were delayed until BCBSM's new fiscal year began in October 2016. MSHOP leaders expressed that, as with the original MSHOP target enrollment goal, the criteria were inaccurately based on surgical

[7] For more information, please see http://michiganvalue.org/.

volumes of all elective inpatient procedures and did not properly exclude elective procedures, urgent, emergent, and other surgeries conducted in less than two weeks.

IV. FINDINGS FROM ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

The baseline characteristics presented in this report are based on the Medicare FFS beneficiaries who were enrolled in the MSHOP (that is, screened and found to be at elevated risk for postsurgical complications) and whose name was sent to us by the awardee. The event that sets prehabilitation services in motion is an outpatient consultation between a patient and a participating surgeon at least one week before a scheduled, qualifying abdominal operation. In July 2016, the University of Michigan received approval from CMS to use an expanded list of eligible abdominal procedures for selecting candidates for the intervention. During the consultation, the surgeon's office staff invites the patient to enroll in the prehabilitation program. If the patient agrees to join, he or she is enrolled during the consultation. The prehabilitation intervention usually lasts for one to two weeks after a patient enrolls until the operation is performed. If the surgery is rescheduled, then the intervention period may last several weeks longer. The awardee expects that most qualifying surgeries will be performed on an inpatient basis.

A. Baseline characteristics of treatment group

As of the end of May 2016, the awardee had enrolled 1,022 participants. According to the information on the finder file, 41 percent (419 individuals) were Medicare-only beneficiaries, 8 percent (78 individuals) were Medicaid-only beneficiaries, and one percent (10 individuals) were dually eligible for Medicare and Medicaid. According to the finder file, the remaining half of participants (515 individuals) had other sources of health care coverage, or they were uninsured.

We excluded 278 beneficiaries who received prehabilitation services for procedures not included in the expanded list of eligible surgical procedures approved by CMS in July 2016. At the end of the second program year, the awardee proposed to expand the number of eligible abdominal surgical procedures in an effort to increase enrollment and began to enroll patients scheduled for the proposed procedures before receiving approval from CMS. Ultimately, CMS approved most, but not all, of the newly proposed procedures. As a result, the awardee had to retroactively identify on the finder file those patients who were already enrolled even though their procedure was not approved and mark them as ineligible for services funded through HCIA R2. We also excluded another 24 enrollees because their participation in the intervention was suspended. According to the awardee, enrollees can be suspended for many reasons. They can withdraw voluntarily, they can change surgeons, they may die before their operation is performed, or their surgery can be cancelled or postponed until an unspecified date. Of the remaining 720 enrollees on the finder file, we were able to find 504 in the Medicare enrollment database (more than the number of awardees reported as Medicare beneficiaries on the finder file).

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been

enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded beneficiaries who did not meet the above criteria, 222 participants were included in the analysis of baseline characteristics for this report.[8] Most of those who were excluded were dropped because they were enrolled in Medicare managed care or they were enrolled in MSHOP after May 31, 2016.

In terms of demographic characteristics, the University of Michigan enrolled a fairly representative group of Medicare beneficiaries (Table 2). Over half of the participants (55 percent) are age 65 to 74, and nearly one-quarter of them (23 percent) are older than 74. Slightly more than half of the participants (55 percent) are female. Most of the participants (89 percent) are white. Blacks represent the next largest racial group at 9 percent. The participants are predominantly Medicare-only beneficiaries (82 percent); only 18 percent are eligible for both Medicare and Medicaid.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 222)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	48	22
65 to 74	123	55
75 to 84	43	19
85 and older	8	4
Gender		
Female	122	55
Male	100	45
Race		
White	197	89
Black	19	9
American Indian, Alaska Native, Asian/Pacific Island American, or other	3	1
Hispanic	1	0.45
Original reason for Medicare eligibility		
Old age and survivor's insurance	148	67
Disability insurance benefits	72	32
End-stage renal disease (ESRD)[a]	2	0.9

[8] It is also worth pointing out that we were able to find a professional claim from a participating surgeon for an eligible procedure after the anticipated surgery date for 140 of these 222 matched beneficiaries. Missing claims could occur for a variety of reasons. For example, the operation had not yet been performed, or it was performed, but the claim had not been submitted; the surgery was billed under a different procedure code or under a different provider ID; or the procedure was performed on an outpatient basis.

Table 2 *(continued)*

Characteristics	All participants (N = 222)	
	Number	Percentage
Hospice[a]		
Medicare/Medicaid dual status, percent dual[b]	39	18
HCC score[c]		Statistic
Mean		2.32
25th percentile		1.09
Median		1.79
75th percentile		3.17

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which a beneficiary consented to participate in the program, which usually occurs at least one week before a scheduled surgery. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Despite the demographic similarity of MSHOP participants to Medicare beneficiaries in general, the health care utilization and spending of MSHOP participants is well above the U.S. average. A large minority of participants (32 percent) became eligible for Medicare because of a disability. Furthermore, the average hierarchical condition category (HCC) risk score for MSHOP participants is more than twice the average HCC score for Medicare FFS beneficiaries nationally. Table 3 lists a common set of cost and utilization measures, including core measures from the Center for Medicare & Medicaid Innovation. The University of Michigan's primary goal for its target population is to reduce surgical complications by 10 percent. Because surgical complications often lead to longer inpatient stays after surgery, the awardee is also seeking to reduce the length of inpatient hospital stays by 2.3 days per case and, in turn, to lower payments for inpatient cost of care to hospitals by $2,561 per case. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare expenditures, in total and by major types of services. The total average PBPM Medicare expenditure during the baseline year was $2,188—nearly three times the 2014 national average for Medicare FFS beneficiaries of $792.[9] The average PBPM Medicare expenditure in the baseline year ranged from $1,585 in the second quarter to $3,420 in the fourth quarter, reflecting an increase in the intensity of services in

[9] Except for ambulatory observation bed stays, national cost and utilization data are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

the quarter immediately before enrollment. Medicare expenditures for inpatient services ($904 PBPM) were the largest driver of total cost of care for participants, followed by expenditures for outpatient services ($563 PBPM) and physician services ($463 PBPM).

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	222	211	217	222	222
Average Medicare expenditures PBPM[a]					
Total	2,188 (195)	1,614 (313)	1,585 (274)	2,066 (265)	3,420 (337)
Acute inpatient	904 (127)	727 (198)	639 (181)	807 (187)	1,418 (264)
Inpatient other[b]	25 (15)	51 (50)	17 (16)	34 (33)	0 (0)
Outpatient[c]	563 (67)	251 (32)	344 (78)	626 (99)	1,001 (97)
Physician services	463 (31)	332 (40)	359 (60)	428 (46)	721 (52)
Home health	81 (12)	68 (19)	72 (21)	76 (19)	108 (22)
Skilled nursing facility	75 (21)	123 (50)	71 (41)	26 (17)	82 (40)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	77 (15)	63 (18)	83 (28)	72 (16)	90 (18)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	897 (106)	697 (141)	618 (129)	841 (140)	1,405 (206)
Outpatient ED visits	915 (129)	833 (196)	805 (166)	988 (218)	1,027 (138)
Observation stays	163 (33)	136 (57)	112 (45)	238 (64)	162 (53)
Primary care visits in any setting	8,829 (580)	8,505 (899)	7,542 (686)	8,340 (697)	10,847 (918)
Primary care visits in ambulatory settings	6,399 (350)	6,084 (551)	6,008 (467)	6,218 (461)	7,243 (506)
Specialist visits in any setting	15,860 (928)	13,504 (1,469)	13,288 (1,094)	13,314 (1,104)	23,027 (1,204)
Specialist visits in ambulatory settings	12,133 (736)	9,765 (1,010)	10,705 (894)	10,114 (853)	17,694 (862)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	45 (3)	13 (2)	12 (2)	17 (3)	25 (3)
Percentage with an outpatient ED visit[e]	42 (3)	13 (2)	15 (2)	16 (2)	22 (3)
Percentage with an observation stay[f]	14 (2)	3 (1)	3 (1)	6 (2)	4 (1)
Percentage with a 30-day readmission among all discharges	24 (3)	23 (7)	30 (9)	12 (5)	28 (5)
Percentage of participants with a readmission among all participants	11 (2)	3 (1)	3 (1)	2 (1)	5 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. The enrollment date is defined as the date on which a beneficiary consented to participate in the program, which usually occurs at least one week before a scheduled surgery. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Baseline year expenditures and health care utilization figures include eligible Medicare FFS beneficiaries who received prehabilitation services for procedures not included in the list of procedures approved by CMS in July.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

The MSHOP participants' average use of expensive Medicare services was high before the surgical admission that precipitated enrollment. For instance, the annual inpatient hospitalization rate of 897 per 1,000 beneficiaries was over three times the national annual rate of 274 admissions per 1,000 beneficiaries in 2014. The annual rate of 915 emergency department (ED) visits that did not lead to a hospitalization per 1,000 participants was more than twice the 2013 national Medicare FFS rate of 445 per 1,000 beneficiaries. Furthermore, the annual observation stay rate of 163 per 1,000 participants was nearly three times the observation stay rate of 56 per 1,000 beneficiaries for all Medicare FFS beneficiaries in 2013.[10] Forty-five percent of the MSHOP participants had at least one hospitalization during the year before enrollment; 42 percent also had an ambulatory ED visit at least once. The likelihood of a 30-day readmission among participants was also high (24 percent per discharge) compared with the 2014 national average for Medicare FFS beneficiaries (18 percent per discharge).

The higher rates of acute care service use and 30-day readmissions might reflect participants' poor health status overall and their general susceptibility to medical complications. The preoperative intervention is designed to reduce complications from scheduled surgery only; it is unlikely to have a significant effect on long-term costs or use of health care services.

At baseline, the annual rate of specialty service use for program participants in any setting (15,860 per 1,000 Medicare FFS beneficiaries) was substantially higher than the rate of primary care visits in any setting (8,892 per 1,000 Medicare FFS beneficiaries). This may be appropriate given the substantial health care needs of this population and the high need for specialty care services before major surgery.

Over the course of the four baseline quarters leading to enrollment, we observed a generally upward trend in the average PBPM total payments and in the average PBPM payments for inpatient, outpatient, and physician services. We observed a similar trend in rates of hospitalizations, outpatient ED visits, observation stays, and specialty services. Thus, beneficiaries targeted for this intervention are high-cost patients who often use acute care during the year before enrollment; they are also extremely high-cost patients who often use acute care services in the quarter just before enrollment. This trend has important implications for selecting a comparable cohort of Medicare FFS beneficiaries for the comparison group.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

[10] See MedPAC, "A Data Book: Health Care Spending and the Medicare Program," June 2015.

Table 4. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: University of Michigan

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	326
Projected Medicaid population with 6 months of program exposure	210
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,164
Likelihood of all-cause hospitalizations	763
MDE sample size requirement to detect 20% effect	
Total expenditures	291
Likelihood of all-cause hospitalizations	191
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA-R2 award
Claims sufficient to identify intervention and comparable comparison group?	No, low rate of identification of treatment group with claims data with significant dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Serious concern. We may be not able to identify a strong comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	None

We do not plan to conduct a rigorous impact estimate of the MSHOP program. The number of projected enrollees is slightly greater than the number needed to detect an effect of 20 percent on Medicare expenditure, which suggests that undertaking a full analysis may be worthwhile. There is, however, an additional obstacle that further complicates analysis of the program. Many of the beneficiaries who appear in the finder file and undergo an eligible surgical procedure were treated not at practices enrolled in the MSHOP HCIA R2 program, but rather practices that have continued to participate in an earlier pilot program. The pre-intervention period for these practices would therefore need to be several years earlier than for practices in the MSHOP program itself, creating analytic complications in addition to the small sample size.

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V. NEXT STEPS

A. Implementation evaluation

As the University of Michigan enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

Our ability to produce impact estimates will depend heavily on the continued recruitment of surgical practices and on the enrollment of patients scheduled to receive abdominal surgeries. The current rate of enrollment casts doubt on the likelihood of achieving the necessary number of enrollees. The baseline characteristics presented in this report are for the 222 Medicare beneficiaries enrolled before June 2016 whom we could find in the Medicare enrollment database and who met our inclusion criteria. With little over a year remaining in the program, it is unclear whether the University of Michigan will have enough enrollees to support a differences-in-differences impact analysis, given the low statistical power to detect meaningful effects. Moreover, because we cannot replicate the risk assessment used to identify the target population of patients who have an elevated risk for post-surgical complications, we will need to use an intent-to-treat approach, in which a relatively high percentage of actual enrollees must be in the pool of potential enrollees. The current 7:1 ratio of potential enrollees to actual enrollees observed in the claims data will not meet that threshold. Modeling enrollment may improve the ratio, but it may still fall short of the minimum percentage needed to conduct an intent-to-treat analysis.

Assuming that the University of Michigan can significantly increase enrollment during the final year of its program, there are two main steps in the impact analysis. The first step is to identify the intent-to-treat group in the post-intervention period. To do this, we will link the Medicare participants in the MSHOP who are listed in the finder file to the claims submitted by their surgeons. We will then use the expanded list of eligible procedure codes approved by CMS in June 2016 to identify all Medicare beneficiaries who received a qualifying abdominal surgery from a participating surgeon during the intervention period but who were not enrolled in the MSHOP. We will combine the enrollee and the non-enrollee groups and use factors associated with their health status before their surgery to model the probability of being enrolled in the MSHOP. If the model does a good job of predicting enrollment, and if the proportion of enrolled to non-enrolled patients is large enough, we will move to the second step, which is to identify a matched comparison group of surgical practices.

To identify these practices, we will (1) ascertain the characteristics of the surgical practices that joined the program and identify a matched comparison group of practices in Michigan or in adjacent states that are similar to Michigan; (2) identify Medicare beneficiaries who received an

eligible surgery by a participating surgeon in the pre-intervention period and those who received an eligible surgery from a surgeon in the comparison group in both the pre-intervention and the intervention periods; (3) use the results of the enrollment model estimated in the first step to identify beneficiaries with a high probability of being enrolled; (4) compare baseline characteristics across the high-probability beneficiaries in the treatment and comparison group practices; and (5) produce initial impact estimates for the first four quarters of program operations after creating our outcome (both core and awardee-specific) and explanatory variables.

If there are enough Medicaid enrollees, and if we can obtain their claims data for the pre-intervention and the intervention periods, we will replicate this analysis for the Medicaid population.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, medical assistants, and office managers. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include surgeons, physicians, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experiences in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.34.

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REPORT

APPENDIX B.34

HCIA Round Two Evaluation: University of New Mexico, Health Sciences Center

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Access to Critical Cerebral Emergency Support Services (ACCESS) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the progress of the University of New Mexico, Health Sciences Center in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare and Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the University of New Mexico made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has the University of New Mexico addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the University of New Mexico's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the ACCESS program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The University of New Mexico has used HCIA R2 funding to implement the ACCESS program, which provides tele-health consultations to hospitals in New Mexico to treat patients with neuro-emergent conditions when they present in the emergency department (ED). Launched on May 4, 2015, the ACCESS program grew out of observations by University of New Mexico hospital staff that many patients with neuro-emergent conditions were being unnecessarily transferred from their local hospitals to the University of New Mexico—the state's only Level I trauma, tertiary care provider—at great time and expense ($25,000 to $50,000 per transfer). The ACCESS program supports hospitals in effectively treating these patients locally, often avoiding unnecessary and costly transfers. As of July 2016, there were eight hospitals participating in the ACCESS program. Collectively, they had conducted almost 500 tele-health consultations.

Through tele-health consultations, the ACCESS program connects hospital ED clinicians to specialists. When a patient presents in a participating hospital's ED with a neuro-emergent condition, the ED physician uses the Net Medical Xpress Solutions (NMXS) tele-health platform to communicate with a neurologist or neurosurgeon. These specialists, contracted by either NMXS or the University of New Mexico, examine the patient, review imaging, and discuss treatment options through the technology's secure file transfer and video capabilities. Based on the consultation findings, the patient is either discharged, admitted, or transferred. An ACCESS nursing staff member follows up with patients after 48 hours and again after 30 days to assess consultation outcomes, such as patient satisfaction. Tele-health coordinators (THCs), who are located at each participating hospital, facilitate the consultation process and serve as the primary liaison between ACCESS and ED staff at participating hospitals.

The ACCESS program facilitates tele-health for two specialties: neurology and neurosurgery. Although both types of specialists treat conditions related to the brain and nervous system, neurosurgeons consult on conditions that may require surgery. Six of the eight participating hospitals already had tele-neurology in place prior to the HCIA R2 cooperative agreement, though only two were actively using the service.[2] Therefore, for this specialty, the awardee has focused on providing more advanced technology, training, and support. The tele-neurosurgery consultations, however, are new for all participating hospitals under the ACCESS program.

Participating hospitals treat patients with tele-health consultations through ACCESS regardless of the payer. Although the cooperative agreement covers the cost of consultation services for adults insured through Medicaid or Medicare, hospitals must cover the consultation fee to provide services for privately insured or uninsured patients. The cost of the consultation ranges from $600 to $1,200, depending upon its type and duration.

The ACCESS program aims to increase tPA administration, increase patient retention at local hospitals, and ultimately produce cost savings for the health care system by avoiding unnecessary hospital transfers. In addition, University of New Mexico staff hypothesize that the

[2] In each of these six participating hospitals with prior tele-neurology capabilities, the ACCESS program replaced and enhanced those capabilities. It enhanced technology and added capacity in the areas of neurosurgical consultations, education, and support services.

ACCESS program will improve quality of care by facilitating time-sensitive triage decisions and expediting transfers for patients in critical condition. Finally, the awardee aims to improve patients' satisfaction by treating them closer to home, as well as ED physicians' confidence and capacity to treat patients locally. Please see Table 1 for more details.

A. Summary of findings from the first annual report

In the program narrative included in our first annual report, we identified several successes achieved by the University of New Mexico during the first year of its cooperative agreement.

- Participating hospitals were positive about the consultation process, indicating that the technology was intuitive and that consultations happened relatively quickly and were a natural part of the diagnostic exam.

- Participating hospitals reported that fewer patients were transferred unnecessarily due to the ACCESS program. These patients preferred to be treated locally rather than being transferred to a tertiary center, which could be costly and disruptive for them and their families.

- Participating hospitals also reported that they felt more confident in treating patients locally when a specialist reviewed the scans and provided guidance about treatment. They commonly used administering tissue plasminogen activator (tPA) as an example. Although tPA can be lifesaving for some stroke patients, it can be deadly when brain bleeding has occurred, which can be difficult to identify initially. Hospital leaders reported that the ACCESS consultations gave hesitant ED physicians the confidence to prescribe tPA.

- The ACCESS program's strong partnership with NMXS was vital to the program's success. Because of the long-standing experience of NMXS, the University of New Mexico did not have to develop new technology or a new consultation process.

- THCs reported that ACCESS staff provided their hospitals with extensive support, which facilitated implementation.

We also identified several challenges in implementing the program and the University of New Mexico's strategies for addressing them.

- The University of New Mexico faced challenges recruiting hospitals. Hospitals were primarily concerned with covering the consultation costs for privately insured patients as well as how to sustain the program after the cooperative agreement ended. The University of New Mexico worked with hospitals to help them understand the financial benefits of retaining patients locally through the tele-health consultations instead of immediately transferring them to other hospitals.

- The hospitals' contracting processes were also often lengthy, which slowed implementation. To address this challenge, the awardee integrated additional strategies when working with hospitals within health care systems while increasing their focus on recruiting independent hospitals.

- Once hospitals committed to joining the ACCESS program and signed a contract, all contracted neurologists and neurosurgeons who might provide a consultation had to be credentialed. Bottlenecks in hospital processes, especially at hospitals in large health care systems, delayed credentialing for months. To address this, the University of New Mexico developed a how-to guide on credentialing and worked closely with hospital administrative staff to move the process forward.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the University of New Mexico made progress in the following areas:

- The University of New Mexico implemented the ACCESS program in 5 additional hospitals for a total of 8 hospitals. Currently, the awardee is in active negotiations with another 10 hospitals.
- After resolving delays in the credentialing of neurosurgeons, the University of New Mexico expanded the ACCESS program to include neurosurgery tele-health consultations in eight hospitals. This allowed program staff to focus on both neurology and neurosurgery tele-health consultations as originally intended. Although neurology primarily targets individuals who have suffered from a stroke, neurosurgery addresses individuals who may need a surgical procedure, such as those with a traumatic brain injury or a brain tumor.

In Year 2, the University of New Mexico also made several changes to its program:

- The ACCESS program's catchment area now includes hospitals in more urban areas, given that urban hospitals also typically transfer patients with neuro-emergent conditions to tertiary centers instead of treating them locally.
- The University of New Mexico also implemented a robust quality assurance strategy to promote consistent implementation across a given hospital's ED physicians and to ensure that patients were receiving high quality care from the consulting neurologists and neurosurgeons.

Below we note the key challenges that the University of New Mexico has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- The ACCESS program continues to experience slow enrollment, primarily due to low hospital take-up. In addition, hospitals that join the ACCESS program tend to have low utilization, resulting in only a handful of consultations per month per hospital. The University of New Mexico is working to bring on hospitals within two large health care systems to increase enrollment.
- Even in hospitals that have implemented the ACCESS program, high turnover among ED clinicians and use of contract employees have resulted in sporadic use of the program and continual monitoring and support from University of New Mexico staff.

- Although the University of New Mexico has implemented trainings for hospitals on neurology and neurosurgery topics, participation is low due to hospitals' competing priorities. To increase use, the University of New Mexico implements trainings through multiple venues, including virtual meetings, on-site visits, and annual conferences.

The University of New Mexico is continuing to develop and test the ACCESS payment model during the final year of its cooperative agreement and is planning the following activities:

- Considering incorporating a shared-savings approach to promote hospital use and sustainability.
- Calculating the cost savings of tele-health as a result of fewer helicopter transfers based on statewide Medicaid claims.
- Working with the American Medical Association to develop procedure codes for the service.
- Meeting with Medicaid managed care organizations (MCOs) to encourage reimbursement.

Table 1. University of New Mexico: ACCESS characteristics at a glance

Program characteristic	Description
Purpose	The University of New Mexico (UNM) implemented the ACCESS program to facilitate tele-health consultations for patients who present at a participating hospital's ED with a neuro-emergent condition. The tele-health platform allows the consulting neurologist or neurosurgeon to view scans, assess the patient via video, and recommend a treatment plan.
Components	Tele-health
Target population	• Adults and children who present in a participating ED with a neuro-emergent condition. • Adults may be insured through Medicare, Medicaid, or not covered by either insurance. Children may be insured through Medicaid, CHIP, or neither.
Theory of change/theory of action	UNM hypothesizes that tele-health consultations will decrease the time it takes for the patient to receive a treatment recommended by a specialist, decrease unnecessary hospital transfers, improve physician confidence in treatment decisions, and improve patients' satisfaction because they are being treated closer to home. In turn, the access to specialty care provided locally through tele-health will result in better health outcomes and lower health care costs.
Payment model	New fee-for-service (FFS) payment and shared savings
Award amount	$15,042,466
Launch date[a]	May 4, 2015
Setting	Hospital ED
Market area	Initially rural, then expanded to the entire state
Market location	NM
Core outcomes	Lower health care costs due to a reduction in unnecessary hospital transfers

[a]After a planning period, the awardee's program became operational as of this date.

ED = emergency department

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the University of New Mexico in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 11 to July 20, 2016. For the analyses of the University of New Mexico's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program participants:

- Awardee leaders
- University of New Mexico clinical trainers
- The liaison between the University of New Mexico and participating hospitals, who supports tele-health consultations and data collection
- The THCs
- Leaders at a participating hospital

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

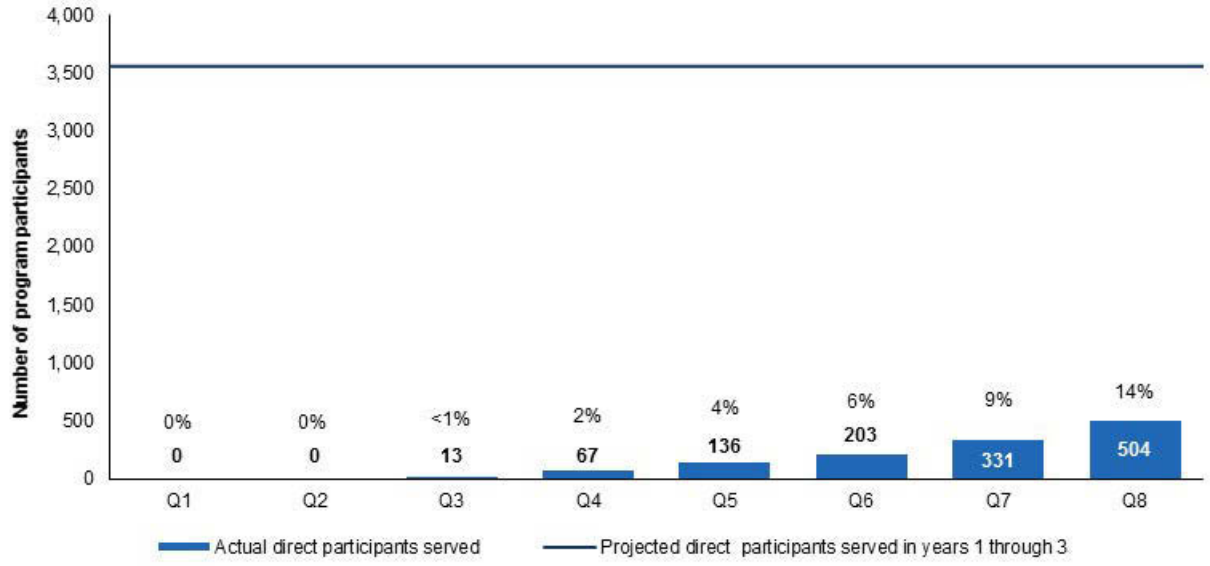
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the University of New Mexico's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

The University of New Mexico continued to struggle with low enrollment in its ACCESS program due to slow hospital take-up. Overall, the University of New Mexico reported to the implementation and monitoring contractor that it directly served 504 participants from May 2015 (the launch of its program) through August 2016, which represents about 14 percent of its 3,556 projected direct participants (Figure 1). The University of New Mexico also reported that it indirectly served 143 participants from May 2015 through August 2016, which represents about 6 percent of its 2,446 projected indirect participants (Figure 2).

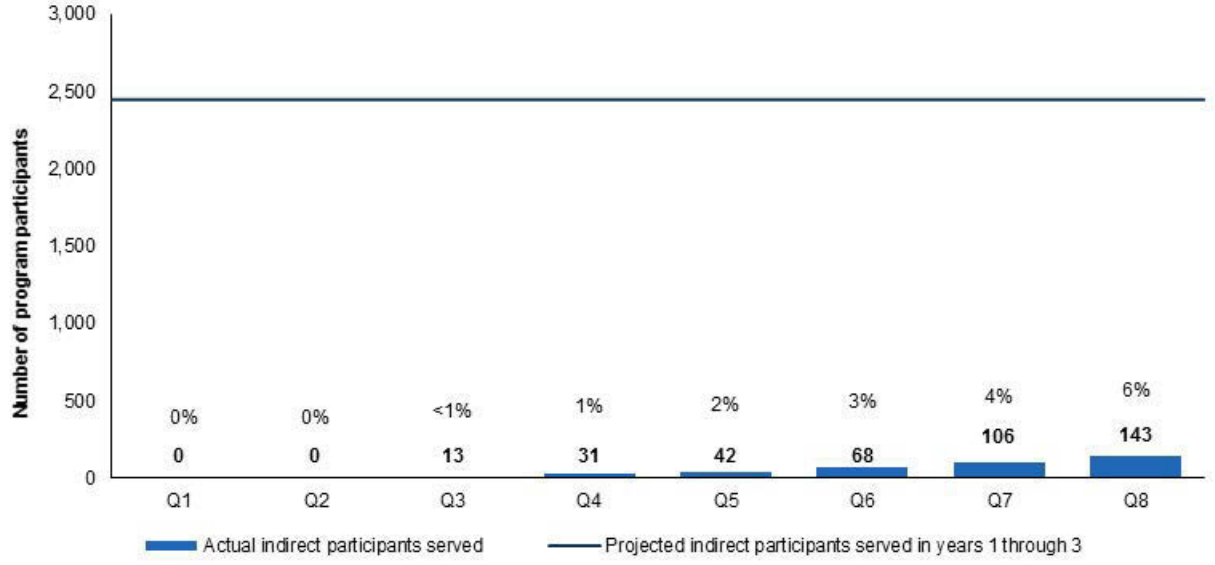
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter.

The number of consultations conducted through the ACCESS program depends primarily on the number of hospitals participating in the program. Since the cooperative agreement began, University of New Mexico staff have been dedicated to educating New Mexico hospitals on the benefits of the ACCESS program for patient care and generating revenue for the local hospital. However, as of July 2016, only 8 of the 42 potentially eligible hospitals were participating in the program, up from 3 hospitals at the time of the last site visit in October 2015.

The ACCESS program continued to struggle with low hospital participation due to concerns with sustainability. Because insurers do not reimburse for tele-health, hospitals are concerned about covering the cost of privately insured patients during the life of the cooperative agreement and all patients once the cooperative agreement ends. In addition, long contract negotiations and processes to credential consulting neurologists and neurosurgeons have prolonged enrollment. The University of New Mexico has implemented three main strategies to address lagging enrollment:

1. The awardee expanded the program's eligibility criteria in early 2016 to include hospitals in urban areas, in addition to those in rural areas. Two newly eligible urban hospitals (Presbyterian Hospital and Lovelace Medical Center) are the hubs of larger health care systems, each of which includes multiple rural hospitals. All hospitals within these systems transfer their neurosurgery patients to the University of New Mexico or other tertiary hospitals for treatment. By incorporating all hospitals within these systems into the

ACCESS program, the University of New Mexico hopes to increase utilization. Although the University of New Mexico is confident that these systems will eventually come on board, the contract negotiation process has been slow.

2. The University of New Mexico has been educating hospitals on the potential financial impact of ACCESS by obtaining and analyzing patient transfer data. These data can show that many transfers were unnecessary, in addition to the revenue the hospital could have generated by treating the patient locally. In addition, University of New Mexico staff believe that word of mouth from participating clinicians will encourage hesitant hospitals to join the program.

3. The University of New Mexico implemented a delegated credentialing program so that neurologists and neurosurgeons could begin conducting consultations sooner at new ACCESS hospitals. Delegated credentialing removes the administrative burden from participating local hospitals because a separate entity verifies the specialists' credentials, evaluates their qualifications, and makes the final determinations. The University of New Mexico and the participating hospitals compile credentialing paperwork prior to signing a contract, so once the contract is in place the hospital is able to submit all credentialing forms immediately. In addition, the nurse who serves as a liaison between the hospital, the University of New Mexico, and NMXS uses her professional connections with the consulting neurologists and neurosurgeons to obtain the required paperwork on the specialist end of the credentialing process.

Although the enrollment process continues at a rate slower than originally anticipated, University of New Mexico staff feel that enrollment efforts are paying off. Staff reported that they are in active negotiations with 10 additional hospitals. If all these hospitals join, ACCESS should see its number of consultations increase significantly over the next year. In preparation, the University of New Mexico has signed a contract with a group of 13 neurologists to ensure that there is capacity to treat patients at all participating hospitals.

B. Implementation of the service delivery model

The design of the ACCESS consultation process has remained largely unchanged since the program began. Participating hospital staff appreciate the service and intuitiveness of the technology. Hospital staff reported that they have timely access to neurologists and neurosurgeons through the ACCESS program. Consultations typically take place within 30 minutes of the request. In addition, they report that the technology to request and conduct a consultation is straightforward and that consulting specialists provide high quality diagnostic services.

> "Our equipment before we went through ACCESS was not good quality. Sometimes it would work, sometimes it wouldn't. We haven't really had any issues with this equipment here [with ACCESS]. The patients can actually understand the neurologist. The communication is really good. It does make our patients feel comfortable."
>
> *— THC at participating hospital*

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- Intervention characteristics reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- Implementation processes are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- The organizational and external context comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

> "The telemedicine for neurosurgery is turning out to be very useful. Probably at least half the patients I've seen are patients with small bumps, little bruises in the brain—neurologically intact—who if you didn't have a neurosurgeon to say, 'Dad's probably just fine. Let's get a scan in six to eight hours and keep dad in the local hospital,' they [would] have that person in the airplane."
>
> *— Consulting neurosurgeon*

The University of New Mexico expanded the scope of the ACCESS program by launching tele-neurosurgery in eight hospitals to support patients with possible surgical needs, such as those suffering from traumatic brain injury or brain tumors. Tele-neurology was implemented in the first year of the cooperative agreement. The ACCESS program promotes a more accurate and immediate diagnosis because the consulting neurosurgeon can view scans and speak with the patient and family by video monitor, whereas the process in place before the ACCESS program (the Physician Access Line or PALS) simply involved a phone consultation. Take-up of tele-neurosurgery has been lower than that of tele-neurology, primarily because related conditions are considered more high risk and ED physicians are still not accustomed to this type of consultation. They may feel more comfortable transferring patients with complex and potentially critical conditions than treating them directly. University of New Mexico nurse trainers have been communicating the advantages of the ACCESS program over the PALS to hospitals to encourage increased utilization. In addition, they are working with the PALS call center to divert referrals back to the ACCESS program.

2. Implementation processes

The University of New Mexico focused on training during the second program year, both to increase awareness and utilization of ACCESS and to introduce a new type of consultation (neurosurgery) for the program. To streamline access to care, consultation requests are now automated and support triaging patients based on acuity. When the ACCESS program was first launched, ED clinicians would make a request for a consultation by calling the NMXS call center. Call center staff would then record patient information and contact the specialist. Patients were treated on a first-come-first-served basis. To better document requests and avoid data entry error, ED clinicians now make a request via an online form that is available on computers in the

ED at participating hospitals. In addition, local ED clinicians rank patient acuity as 1 through 4 based on guidelines provided by the University of New Mexico, a system that ensures that patients with the highest needs are treated first. This prioritization is especially crucial as the ACCESS program plans to expand to include more hospitals, which could potentially strain NMXS as well as the specialists' capacity. Once the information is processed, call center staff call the local hospital to report on the availability of the specialist. To date, the ACCESS program has had the capacity to serve all consultation requests. University of New Mexico staff anticipate no problems with meeting the needs of increasing enrolment.

Although tele-health is the ACCESS program's primary tool in building hospital capacity to better treat patients with neuro-emergent conditions, the University of New Mexico offers several other ways for hospitals to gain more knowledge on related conditions and treatments. First, the ACCESS program offers Continuing Medical Education (CME) credits through a five-part online course to hospitals that includes the following topics: (1) neurological assessment, (2) tPA (3) stroke, (4) traumatic brain injury, and (5) case studies. Second, the ACCESS program holds an annual conference on tele-health with participating hospitals to teach strategies for maximizing the use of the technology both within and outside of the neurology and neurosurgery fields. Finally, the ACCESS program launched weekly virtual grand rounds during the second year of the cooperative agreement to promote more physician-to-physician training. Although use of the live video-streaming platform was relatively low because many clinicians were treating patients at the time, the meeting gives hospitals a chance to speak with each other and with specialists within the University of New Mexico on specific cases and treatment options.

On-site visits are perhaps the ACCESS program's most effective training strategy because nurse trainers can directly assess hospital capacity and offer tailored guidance. Prior to implementation at a new hospital, nurse trainers conduct a review of the hospital's capacity and identify training needs. This review includes the use of the tele-health technology itself and a hospital's overall capacity to treat a patient if admitted to the hospital for continued neurological care. These initial reviews also inform summary documents that are shared with the consulting specialists, so they can better understand a hospital's unique resources and advise hospitals on whether to admit or transfer a patient. Nurse trainers also periodically conduct on-site "Listen and Learn" sessions to identify and address ongoing issues and needs.

> "The ED physician may feel comfortable with the backup of the consulting specialist, but perhaps [in] the inpatient unit, the nurses have not really dealt with many neuro-admissions. We wanted to provide that competence and comfort to the clinical staff beyond the telemedicine consults."
>
> *— University of New Mexico nurse trainer*

With the implementation of neurosurgery consultations, nurse trainers also played a key role in helping hospitals distinguish between neurology and neurosurgery patients. The University of New Mexico has extensive expertise in triaging and treating patients with neuro-emergent conditions. Therefore, when the neurosurgery component was launched, NMXS and the University of New Mexico partnered to develop a grid of "common diagnoses or presentations" for both neurology and neurosurgery to help the hospitals make the right type of consultation request. Nurse trainers report that their role in aligning the technology with the clinical needs is as important as their role in training hospital staff on neuro-related content.

The University of New Mexico has recently implemented quality monitoring to identify program gaps and improve processes. Although the THCs act as the "eyes and ears" of the ACCESS program by reporting to the hospital liaison any issues that may arise, the University of New Mexico has developed more formal reporting and monitoring processes. For example, hospitals can submit incident reports regarding technical issues or concerns with consultation quality. In addition, a neurologist and a neurosurgeon review a sample of clinical consults every other week to ensure that the recommendations by the consulting specialists were appropriate and that the patient received the highest quality care possible. One challenge the University of New Mexico faces is that it only has access to data generated at the ED, so it must go back to the THCs to obtain information from other hospitals settings. To overcome this barrier, the awardee is working to establish a more standardized process to obtain more comprehensive hospital information on patient care. Finally, University of New Mexico staff carefully monitor consultations on a weekly basis to identify any changes in utilization. A sudden drop may mean that a new ED clinician needs to be trained on the process.

> "I talk to the physicians every day and ask them if they're having problems … if, you know, is there anything that we can do better—just so it's constantly on their mind. They remember to put that order in, they remember that it's there, and they utilize it."
>
> *— THC at participating hospital*

The University of New Mexico also uses these trainings and feedback as reminders that the technology exists and should be utilized. By design, the hospitals that participate in the ACCESS program are relatively small. Some hospitals may only see a handful of patients with neuro-emergent conditions a month. Low utilization coupled with staff turnover may mean that hospital ED clinicians lose familiarity with the technology and process. Therefore, nurse trainers, along with the THCs and the hospital liaison, play an important role in reminding hospital staff about the benefits of tele-health and how to request and conduct a consultation with the technology. For example, although Gerald Champion Regional Medical Center had been partnering with NMXS for several years prior to the ACCESS program, leaders reported that once the hospital joined the program the number of neurology consultations more than doubled.

3. Organizational and external context

The University of New Mexico's commitment to the ACCESS program can be seen at all levels of the organization: (1) the hospital liaison works tirelessly with hospitals to understand and address their issues; (2) nurse trainers regularly analyze hospital strengths and weaknesses in providing neuro-related care to customize and improve training products; (3) ACCESS leaders are working with insurance providers, congressmen, and state legislators to promote the use of tele-health; and (4) the ACCESS project investigator is on call 24-7 to provide neurosurgery consultations. This commitment has allowed the ACCESS program to continue recruiting hospitals despite the early challenges.

> "We see other specialties being able to use this platform as soon we've worked all the aspects of it… Hospitals are asking us, 'Okay, so when can we get critical care? When can we get pediatric trauma? What about psychiatry through tele-health? Obstetrics?' There are so many needs in New Mexico and so few physicians that they understand the potential of [tele-health]."
>
> *— University of New Mexico leader*

Tele-health meets a critical need in rural areas. Respondents agreed that the adoption of tele-health in rural areas was important given the high needs and lack of physicians in these areas. Hospitals are eager to move beyond neurology and neurosurgery to other specialty areas to treat their patients locally with high quality care. However, the impact of the ACCESS program depends upon the hospital's ability to treat patients locally. Respondents from local hospitals reported that they were able to retain more patients by participating in the ACCESS program. However, some smaller hospitals are not able to keep their patients regardless of the program's support because of a lack of capacity.

> "The biggest obstacle is the stability of the physician base that we are trying to build experience with."
>
> — *University of New Mexico leader*

Continual turnover within participating hospital ED staff disrupts the ACCESS program. Small, rural hospitals have historically struggled to retain high quality clinicians. In addition, low utilization often does not allow hospitals to employ full-time staff. Therefore, hospitals often rely on contract positions to provide needed care. Because these clinicians may be in a hospital ED for a week or less, they may not be familiar with or invested in the tele-health technology. Although the THCs and hospital leaders play an important role in getting temporary clinicians up to speed, the University of New Mexico has explored the possibility of working directly with the companies that contract out clinicians so that they are aware of the program and can train their clinicians. In addition, during the contract process if hospital leadership changes, implementation may be delayed or halted altogether.

The state's prior experience with tele-health has been both a facilitator of and a challenge to implementation of the ACCESS program. Many of the participating hospitals were already working with NMXS on tele-neurology, which provided an important foundation because hospitals were already familiar with the technology. However, hospitals that did not have good experiences with tele-health may have been less likely to work with the ACCESS program. One hospital, for example, was hesitant to join because it had experienced delays in consultations. After the problem was diagnosed as a bandwidth issue and was addressed, the hospital began participating successfully.

C. Development of the payment model

The University of New Mexico made little progress on its payment model during the second year of the award. Although the awardee established a fee for ACCESS consultations ($600 to $1,200, depending upon type and duration) in the first year of the cooperative agreement, neither public nor private insurance companies have agreed to cover this fee. (From the beginning of the cooperative agreement, the University of New Mexico has charged hospitals for patient consultations.) In addition, the awardee is considering including a shared savings component to its payment model to encourage hospitals to adopt and sustain the technology. To negotiate fees with insurers and develop the shared savings model, the University of New Mexico is hoping to develop a clear understanding of the cost savings generated by the ACCESS program in Year 3. Although utilization has been too low to make these projections thus far, the University of New Mexico plans to take the following steps in the third year of the cooperative agreement:

1. Calculate the cost savings of tele-health as a result of fewer helicopter transfers. The University of New Mexico is currently in the process of obtaining statewide Medicaid claims data to assess the transfer patterns at participating hospitals before and after the adoption of the ACCESS program. Although leaders agree that a different analysis for neurology and neurosurgery should be conducted because costs differ, they are concerned that they may not have enough neurosurgery consultations to conduct a separate analysis.
2. Develop procedure codes for the service. Given that there are no existing procedure codes for tele-health services, the University of New Mexico plans to work with the American Medical Association to establish them.
3. Meet with MCOs. The University of New Mexico plans to start negotiations with Medicaid MCOs in New Mexico because they may be the most receptive to the change, especially because many patients are transferred to out-of-state hospitals, which results in higher costs to Medicaid. The University of New Mexico hopes that once Medicaid agrees to reimbursement, Medicare and private insurance companies will also come on board.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section provides a summary of common and awardee-specific claims-based baseline characteristics for the treatment group, which we measured during the 12 months before each beneficiary's enrollment date. The treatment group consists of adult (age 18 and older) beneficiaries in Medicare fee-for-service (FFS), Medicaid FFS, and Medicaid managed care who received ED services with tele-health consultation at eight New Mexico hospitals participating in the ACCESS program. The treatment group is identified in lists of participants from the awardee.

A. Baseline characteristics of the treatment group

The University of New Mexico began to enroll Medicare and Medicaid beneficiaries in the ACCESS program in May 2015. As of May 31, 2016, the awardee had enrolled 331 direct participants among all payers. About 60 percent of the direct participants were Medicare FFS beneficiaries, while the rest were Medicaid beneficiaries.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who had met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is determined by the enrollment date for each participant, and therefore varies by participant. We also restricted the treatment group to those participants for whom we could identify a precipitating ED visit in claims data. We dropped 8 participants who did not have ED or inpatient claims within three days of their enrollment date. After we excluded patients who did not meet the above criteria, a total of 184 Medicare FFS participants were included in the analysis of baseline characteristics for this report. The awardee continued to struggle with enrolling participants in its seventh program quarter (March 2016 to May 2016). The percentage of its revised three-year projected total participants served since inception increased from 5.4 percent in the sixth program quarter to 9.6 percent in the seventh program quarter.

In this report, we also present the prevalence of hierarchical condition categories (HCCs) and diagnosis codes based on the primary diagnosis at the time of the enrollment ED visit. We examine primary diagnoses for two types of claims separately: (1) inpatient stays that included an ED visit and (2) ED visits that did not result in an inpatient stay. We present the most commonly occurring HCCs and diagnosis codes not associated with an HCC.

The results of our analysis indicate that the University of New Mexico is recruiting a population that is diverse in terms of age and gender, but that it is predominantly white (88 percent of the Medicare FFS sample [Table 2]). The population generally has significant health care needs and high Medicare expenditures (Table 3). Eighteen percent of participants are younger than 65, while 22 percent are 85 or older. Twenty-eight percent were originally eligible for Medicare because of a disability, which is greater than the 24 percent in the Medicare FFS population nationwide who were originally eligible because of a disability. Five percent have

end-stage renal disease (ESRD). Participants are also more likely to be female (58 percent). Thirty percent of participants are dually eligible for Medicare and Medicaid, which suggests that their socioeconomic needs are substantial—particularly, considering that 18 percent of the general Medicare FFS population is dually eligible. Participants are substantially less healthy and have a greater need for care than the general Medicare FFS population, as evidenced by the fact that the participants' average HCC risk score is more than 86 percent higher than that of the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 184)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	34	18
65 to 74	46	25
75 to 84	63	34
85 and older	41	22
Gender		
Female	106	58
Male	78	42
Race		
White	161	88
Black	2	1
American Indian, Alaska Native, Asian/Pacific Island American, or other	9	5
Hispanic	11	6
Original reason for Medicare eligibility		
Old age and survivor's insurance	127	69
Disability insurance benefits	52	28
ESRD[a]	5	3
Hospice[b]	0	0
Medicare/Medicaid dual status, percent dual[b]	56	30
HCC score[c]		Statistic
Mean		1.86
25th percentile		0.97
Median		1.48
75th percentile		2.42

Table 2 *(continued)*

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary had an index visit for an emerging stroke or brain injury in an ED participating in the ACCESS program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

ACCESS participants had high Medicare expenditures and high rates of service use in the year before enrollment. In Table 3, we report baseline expenditure and utilization data for a common set of measures, including the four core measures from the Center for Medicare & Medicaid Innovation. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services. The total average PBPM Medicare payment during the baseline year was $1,530—substantially higher than the 2014 national average of $792.[4] Average PBPM Medicare payments among participants for the following services were the largest drivers of the total cost of care: acute inpatient services, $513; outpatient services (including ED visits), $273; and physician visits, $367.

ACCESS participants had high average use of expensive Medicare services before the index ED visit that precipitated enrollment in the program. The annual rate of acute care hospitalizations was 567 per 1,000 Medicare FFS beneficiaries in the treatment group during the baseline year—well above the national annual average of 276 per year per 1,000 Medicare beneficiaries in 2014. The annual rate of ED visits not leading to a hospitalization was 1,285 per 1,000 beneficiaries, compared with the 2014 national annual rate of 454 per 1,000 beneficiaries. The difference suggests that frequent ED users are more likely to receive services from the ACCESS program, which is not surprising given that the program setting is EDs. In the baseline year, the likelihood of a 30-day readmission (19 percent per discharge) was comparable to the 2014 national average (18 percent per discharge) for Medicare FFS beneficiaries. In addition, the annual rate of primary care visits (9,659 per 1,000 Medicare FFS beneficiaries) was slightly lower than the rate of specialty service use (10,426 per 1,000 Medicare FFS beneficiaries).

From the period that extends from 7 to 12 months before enrollment (baseline quarters 1 and 2) to the period that extends from one to 6 months before enrollment (baseline quarters 3 and 4), we observed a substantial increase in average PBPM total payments (approximately, a 55 percent

[4] The national data here and in the next paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

increase from the average of quarters 1 and 2 to the average of quarters 3 and 4). There was also an increase in average PBPM payments for acute inpatient services (up by 121 percent), physician services (up by 22 percent), home health services (up by 72 percent), and skilled nursing facility services (up by 90 percent). In addition, we observed upward trends in the last baseline quarter relative to the previous three in average PBPM payments for outpatient care. We observed similar patterns in the rates of hospitalizations, outpatient ED visits, observation stays, primary care visits, and specialist visits during the baseline year. These increases indicate that beneficiaries targeted by the ACCESS program were high-cost individuals who were heavy users of acute care services in the year before enrollment, especially in the two quarters that immediately preceded enrollment. This trend has important implications for selecting a comparable cohort of Medicare FFS beneficiaries for the comparison group.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	184	178	180	184	184
Average Medicare expenditures PBPM[a]					
Total	1,530 (257)	1,311 (204)	1,040 (131)	1,610 (491)	2,029 (327)
Acute inpatient	513 (200)	336 (109)	266 (73)	572 (389)	760 (209)
Inpatient other[b]	70 (25)	108 (64)	0 (0)	133 (69)	39 (34)
Outpatient[c]	273 (38)	255 (51)	267 (47)	252 (44)	317 (45)
Physician services	367 (43)	342 (44)	316 (40)	360 (79)	444 (69)
Home health	148 (27)	121 (32)	95 (25)	168 (37)	204 (41)
Skilled nursing facility	119 (31)	108 (49)	55 (38)	88 (55)	222 (73)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	40 (7)	41 (8)	40 (7)	37 (8)	43 (8)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	567 (191)	431 (109)	383 (98)	508 (216)	783 (184)
Outpatient ED visits	1,285 (195)	1,133 (206)	1,148 (174)	1,016 (256)	1,826 (303)

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Observation stays	184 (36)	68 (39)	158 (58)	133 (61)	370 (86)
Primary care visits in any setting	9,659 (753)	8,000 (660)	8,100 (667)	8,569 (739)	13,826 (1,428)
Primary care visits in ambulatory settings	7,396 (440)	6,459 (509)	7,043 (556)	6,825 (523)	9,196 (713)
Specialist visits in any setting	10,426 (1,104)	9,678 (1,023)	10,283 (968)	9,674 (1,708)	12,022 (1,258)
Specialist visits in ambulatory settings	8,074 (587)	7,502 (716)	8,573 (752)	7,553 (715)	8,652 (729)
Measures of any health care utilization					
Percentage with a hospital admission[d]	32 (3)	9 (2)	8 (2)	10 (2)	13 (2)
Percentage with an outpatient ED visit[e]	53 (4)	22 (3)	23 (3)	15 (3)	29 (3)
Percentage with an observation stay[f]	16 (3)	2 (1)	4 (1)	3 (1)	9 (2)
Percentage with a 30-day readmission among all discharges	19 (4)	24 (11)	10 (7)	11 (7)	28 (9)
Percentage of participants with a readmission among all participants	7 (2)	2 (1)	1 (1)	1 (1)	3 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 4: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 4. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: University of New Mexico, Health Sciences Center

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	318
Projected Medicaid population with 6 months of program exposure	0
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	3,811
Likelihood of all-cause hospitalizations	1,558
MDE sample size requirement to detect 20% effect	
Total expenditures	953
Likelihood of all-cause hospitalizations	390
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable. Expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Staff, clinician, and beneficiary surveys
Implementation data that will be analyzed	None

At this point, we do not anticipate being able to conduct a rigorous impact analysis for the awardee because the projected enrollment will not support detecting a 20 percent effect in total Medicare or Medicaid expenditures. We are projecting only 318 Medicare FFS beneficiaries, about one-third of the required sample size. At this point, we have not been able to assess the number of Medicaid beneficiaries due to a severe lag in the Alpha-MAX data for the state of New Mexico. We will monitor enrollment and reassess evaluability should enrollment exceed our current expectations. We do not have any awardee-specific data on implementation to report; however, we will report on the experiences of awardee staff, clinicians, and participants, based on our surveys.

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V. NEXT STEPS

A. Implementation evaluation

As the University of New Mexico enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next step in the impact evaluation will be to monitor enrollment because the current enrollment projections do not provide a sufficient number of participants to conduct a rigorous impact analysis. We will revise our evaluability assessment, if appropriate. In addition, we will further explore the primary diagnoses of participants at the time of enrollment to better define the targeted population and further our understanding of the program's implementation.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include THCs, registered nurses, health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include consulting specialists and ED physicians, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.35.

VENTURA COUNTY HEALTH CARE AGENCY

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REPORT

APPENDIX B.35

HCIA Round Two Evaluation: Ventura County Health Care Agency

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Chronic Obstructive Pulmonary Disorder (COPD) Access to Community Health (CATCH) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Ventura County Health Care Agency's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Ventura County Health Care made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Ventura County Health Care addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its sites to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Ventura County Health Care's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the CATCH program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Ventura County Health Care, a public health agency based in Ventura, California, used funding from HCIA R2 to create the CATCH program. The program's key component is the implementation of guidelines from the Global Initiative for Chronic Obstructive Lung Disease (GOLD) for the care of patients with COPD. In implementing these guidelines, primary care physicians (PCPs) are (1) trained to accurately diagnose COPD in one of four stages of risk and (2) given specific strategies for treatment that are aligned with each stage. Participants in the CATCH program receive care and case management from the program's registered nurses (RNs) and respiratory therapists (RTs), who coordinate care with the PCPs and specialists. Potential participants are identified in multiple ways: (1) during an emergency department (ED) visit or when they are discharged from a hospital, (2) by searching for COPD diagnosis codes in the electronic medical records (EMRs) of participating clinics, and (3) through physician and partner referrals. Once participants are accepted into the CATCH program, they receive an assessment from an RN or RT and are given a spirometry test to identify their COPD stage. CATCH staff began enrolling Medicare and Medicaid beneficiaries in January 2015. The awardee is aiming to enroll 2,500 participants from both Medicaid and Medicare during the three-year cooperative agreement. Its program outcomes include (1) reduced health care costs from reduced ED and PCP visits, (2) increased access to health care, (3) reduced COPD exacerbations, and (4) improved quality of life. The CATCH program includes a payment model, called CATCHpay, that incentivizes providers to train in and follow best practices for COPD. Providers who meet CATCHpay criteria are eligible for incentive payments. Further details are included in Table 1.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Ventura County Health Care during the first year of its cooperative agreement.

- The CATCH program was slightly below the awardee's enrollment expectations. As of August 2015, Ventura County Health Care had enrolled 728 participants in the CATCH program, about 91 percent of the 800 participants it had projected for that point in time.
- CATCH staff helped improve comprehensive health care to individuals with COPD by providing in-home care, thereby solving transportation-related challenges—one of the most commonly mentioned barriers to health care access in Ventura County.

We also identified several initial challenges in implementing the program and Ventura County Health Care's strategies for addressing them.

- Some stakeholders originally resisted implementing the CATCH program. For example, RTs objected to allowing RNs and others to perform pulmonary function tests (PFTs) and asked why the original staffing plan for CATCH did not include RTs. In response, CATCH leaders changed the staffing plan to include two RNs and two RTs instead of the four RNs originally planned. This change resulted in a greater diversity of skills among the CATCH staff and increased buy-in from stakeholders at hospitals and clinics.
- Private hospitals and clinics sometimes resisted referring patients to the CATCH program because they were concerned that the program would "steal" their clients. Program leaders worked to engage such facilities by explaining that the CATCH program was intended to

complement, not replace, the care they provided. As providers come to understand the program better, Ventura County Health Care expects that they will be less reluctant to refer their patients.

Finally, we identified several early lessons learned by Ventura County Health Care in implementing its program.

- Explaining how the program can complement a provider's care can lead to greater buy-in.
- Training and reference materials for physicians must be as succinct as possible.
- Guidelines on participant eligibility must be clear from the start of the program.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Ventura County Health Care made progress in the following areas:

- Ventura County Health Care opened the CATCH clinic, a pulmonary rehabilitation clinic that provides access to a pulmonologist and allows CATCH staff to perform tests that can't be given at participants' homes.
- Ventura County Health Care began recruiting participants from providers who are independent of its health care system and added outside stakeholders to its advisory board.
- Ventura County Health Care adopted the CATCHpay payment model to incentivize PCPs to follow best practices for COPD care. PCPs must complete training and follow best practices (including the GOLD guidelines) to receive incentive payments.

Below we note the key challenges that Ventura County Health Care worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- Integrating CATCH within organizations that are independent of Ventura County Health Care while overcoming physician resistance and hurdles to enrollment due to federal privacy regulations.
- Creating a smoking cessation program for individuals with mental illness.

Table 1. Ventura County Health Care: CATCH characteristics at a glance

Program characteristic	Description
Purpose	Ventura County Health Care is implementing the CATCH program to improve quality of care for Ventura County residents with COPD. The program is designed to improve provider and patient awareness of the GOLD guidelines and to improve access to health care and resources for patients with COPD in order to decrease the incidence of avoidable visits to EDs and visits to PCPs.
Components	• Patient-centered medical home • Patient and family engagement
Target population	Medicare and Medicaid beneficiaries in Ventura County with COPD
Theory of change/theory of action	The CATCH program is expected to lead to better COPD management by teaching the GOLD guidelines to staff in family clinics. The program is also expected to lead to improved outcomes in pulmonary function and quality of life. Finally, the CATCH program will reduce ED and PCP visits, resulting in cost savings to CMS.
Payment model	Shared savings, bundled or episode payment
Award amount	$4,136,499
Launch date[a]	9/1/2014
Setting	Patient home, family clinics
Market area	Urban and suburban
Market location	Ventura County, CA
Core outcomes	• Reduced health care costs from reduced ED and PCP visits • Increased access to health care • Reduced COPD exacerbations • Improved quality of life

[a]After the initial planning period, the awardee's program began to operate as of this date.

CATCH = Chronic Obstructive Pulmonary Disorder Access to Community Health program; COPD = chronic obstructive pulmonary disorder; ED = emergency department; GOLD = Global Initiative for Chronic Obstructive Lung Disease; PCP = primary care physician

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Ventura County Health Care in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 21 through June 27, 2016. For the analyses of Ventura County Health Care's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff: CATCH leaders, frontline staff at two Ventura County Health Care clinics (West Ventura and Santa Paula), one CATCH RT, one CATCH RN, the director of social services at the Community Memorial Hospital (which is independent of the Ventura County Health Care system), and the CATCH clinic director.

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation, on enrollment, on the service delivery model, and on the payment model. Each component includes an update on Ventura County Health Care's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

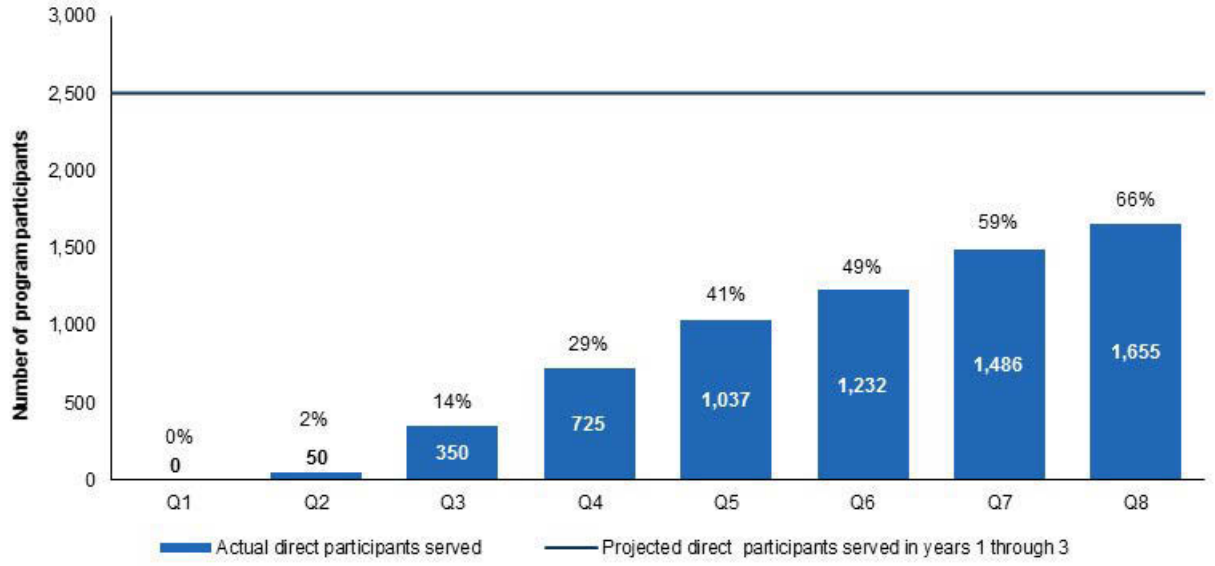
A. Program enrollment

Overall, Ventura County Health Care reported to the implementation and monitoring contractor that it directly served 1,655 participants from January 2015 (the launch of its program) through August 2016, which represents about 66 percent of its 2,500 projected direct participants

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

(Figure 1). The baseline characteristics of participants who we are able to identify in Medicare and Medicaid fee-for-service enrollment and claims data are presented in Section IV.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Ventura does not have indirect program participants.

Ventura County Health Care's progress in meeting its three-year enrollment goal was influenced by several factors. While continuing to enroll participants at clinics and hospitals within its own system, Ventura County Health Care began reaching out to external organizations in Ventura County. However, the awardee found some reluctance from providers who thought the program might siphon away patients. Ventura County Health Care sought to overcome these barriers by offering outside organizations, such as the Community Memorial Hospital, an advisory position on the CATCH board.

B. Implementation of the service delivery model

The CATCH program has continued to move forward in its second year. In addition to enrolling new participants, Ventura County Health Care (1) launched the CATCH clinic, (2) worked with the Gold Coast Health Plan to provide pulmonary rehabilitation benefits to eligible members, and (3) increased the number of spirometry tests given to participants.

Ventura County Health Care began addressing sustainability beyond the end of the HCIA R2 cooperative agreement by developing a five-year strategic plan. One of its components was to have Gold Coast Health Plan (Ventura County's Medicaid provider) begin covering pulmonary rehabilitation for its eligible members. Gold Coast has agreed to provide this benefit.

> "Our local managed care group, which is called Gold Coast, has decided that with a little bit of discretionary funding that they have available to them they're going to authorize that benefit [pulmonary rehabilitation] for all their members, for both Medicare and Medicaid members, which is huge."
>
> — *CATCH leader*

One RT mentioned that some of the CATCH participants have improved their disease condition—for example, reversing their COPD stages from Stage 2 to Stage 1. She credited the improvements to referrals made to pulmonary rehabilitation and better medication adherence gained through participation in CATCH.

Finally, as an HCIA R2 awardee, Ventura County Health Care is required to complete a measurement and monitoring plan. Ventura County Health Care reported large increases in its spirometry evaluation rates. Most participants did not receive spirometry tests before they enrolled in the CATCH program. As of May 2016, 82 percent of CATCH participants had received spirometry evaluations.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of the CATCH program have created advantages and challenges in terms of implementing the program. The implementation of a new CATCH database (MCG/CareWebQI) helped improve program operations in the second program year. The new database is more customizable than the Cerner system used by Ventura County Health Care; this allows CATCH leaders to more easily track specific metrics, such as severity of condition.

One challenge was that Ventura County Health Care found that the launch of a "Better Breathers Club" would require the use of a licensed curriculum from the American Lung Association. The CATCH program uses the American Lung Association smoking cessation program but did not realize that the Better Breathers Club would require an additional, separate licensing fee, which was not included in the original program budget. Ventura County Health Care decided instead to create its own support group, called "Living Well with COPD."

> "When I go to a patient's house, it takes me . . . sometimes three hours or even more with a patient. If you have somebody who's never been told anything about COPD, it takes a long time to go over the questions, to explain to them how they have to take the medications, their breathing exercises. . . . It's a long process."
>
> *— CATCH RN*

Ventura County Health Care also encountered challenges with the initial assessment required for each new enrollee, which proved to be time-consuming. It can take as long as three hours when a participant has never had proper training in the use of an inhaler or medication regimen. At first, CATCH staff were unable to keep up with enrollment because they did not have enough time to conduct lengthy assessments and training with the many new enrollees. One facilitator during Year 2 was planning to contract with nursing agencies to help with the initial assessments and enroll referred participants in a more timely fashion.

2. Implementation processes

Ventura County Health Care has faced barriers in the implementation process during the second program year. The CareWebQI database mentioned above has been both a facilitator of and a barrier to implementation. CATCH staff can now access data securely in more places on their phones, including at the one-stop homeless fair, which has helped the program to provide services more effectively. However, this database is separate from Ventura County Health Care's Cerner system, so information is not always transferred back to the Cerner system for non-CATCH providers to access.

As in Year 1, some Ventura County Health Care providers would like better follow-up from the CATCH program on patients that they have referred. Outside Ventura County Health Care, providers also expressed a wish to create a loop rather than a linear handoff of patients to the CATCH program. Despite these complaints, some providers appreciated that CATCH relieved some of their workload and they were satisfied with the follow-up information that was provided. Other providers have also expressed a desire for more feedback sessions, in which providers could talk to CATCH staff directly to address any provider issues with the program. However, all acknowledge that CATCH staff are always responsive when contacted directly about specific issues.

Finally, CATCH staff have been unable to administer the Six-Minute Walk Test directly in a participant's home as planned because the test requires a long, flat surface. The test can be administered in clinics, however, including the new CATCH clinic. Ventura County Health Care has partially addressed this issue by hiring a dedicated RT to perform the test at the CATCH clinic.

3. Organizational and external context

As Ventura County Health Care has expanded CATCH beyond its own agency, it has encountered additional barriers including increased organizational and regulatory complexity. As a county agency, Ventura County Health Care launched CATCH within its own organization. In Year 2, the awardee increased its outreach efforts to outside organizations in order to expand the program. New barriers to implementation emerged as a result. Although CATCH staff had relatively easy access to patients within the Ventura County Health Care system, they had to adapt to manage different requirements outside of it—especially to conform with varying

interpretations of federal privacy regulations. One of the larger clinics in the county is requiring all CATCH team members to undergo a thorough internal process that includes a background check. This clinic was unwilling to refer patients over the phone or through email, citing federal privacy regulations, so CATCH staff will talk to patients directly at the clinic when the partner clinic completes the background check process.

Ventura County Health Care also had to address regulatory concerns to successfully launch the CATCH clinic. The main issue was that clinics that bill for services have different requirements than providers who provide them for free (with funding from a grant such as HCIA, for example). In particular, the funding distinction determined where the clinic could be located. Because the awardee doesn't directly bill for services, Ventura County Health Care finally decided to open the clinic in its own agency administrative building (instead of at a Ventura County Health Care hospital or clinic).

Ventura County Health Care identified a new barrier to providing services to participants with mental illness. Residents of board and care facilities and of institutions that provide services for the mentally ill are often smokers. Ventura County Health Care believes one of its most important challenges will be to devise a smoking cessation program that is effective for this population before the end of the HCIA R2 cooperative agreement.

Finally, a barrier from Year 1 that persisted in Year 2 was performing the initial assessment in the participant home. Some patients who express interest in participating in CATCH are resistant to having RTs or RNs come into their homes. Ventura County Health Care addresses this concern by offering alternatives, such as meeting outside the patient's home or in a nearby location (for example, in a coffee shop).

C. Development of the payment model

The CATCHpay payment model was approved by CMS and launched in Year 2. To enroll, physicians must follow a five-step process. They first meet with the CATCH team to go over the GOLD guidelines and ensure that they understand how to do the screening spirometry. They then must complete a Continuing Medical Education certification course that is provided by CATCH (as a thumb drive given to providers). They must perform spirometry screening on every at-risk patient. Finally, they must use the "Power Plan" for patients who are diagnosed with COPD, as indicated in the Cerner EMR system. The Power Plan is a set standard of care that is automatically populated in the Cerner system as the physician inputs the COPD stage of the patient.

Although Ventura County Health Care can't require providers (even within the agency) to use CATCHpay, it is strongly encouraged. Most providers will likely enroll because adopting the payment model will make them eligible for incentive payments. A set amount of money will be divided among providers who adopt CATCHpay.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents baseline characteristics of the treatment group, which we measured for the year prior to enrollment in the CATCH program. The treatment group consists of participants who have been diagnosed with COPD or who are at risk of contracting COPD. Patients agreeing to participate in the program are given a pulmonary function test using a spirometer, with the results of the test indicating whether the participant has COPD and the severity of the disease if diagnosed. Those who are diagnosed with COPD are classified into one of four stages of severity that are used by providers to identify strategies for care, which are aligned with each stage. Participants deemed at risk of COPD are enrolled in smoking cessation programs and receive case management services to mitigate their COPD risks.

A. Baseline characteristics of the treatment group

Below we summarize beneficiary characteristics, core claims-based outcomes, and awardee-specific claims-based outcomes during a one-year baseline period for Medicare FFS beneficiaries participating in the CATCH program. Ventura County Health Care began enrolling participants in the CATCH program in January 2015. As of May 31, 2016, 616 Medicare FFS beneficiaries had enrolled. In addition, 779 beneficiaries, who were predominantly Medicaid managed care beneficiaries, were enrolled in the CATCH program over this period. Subsequent analysis will include Medicaid managed care beneficiaries once the encounter data become available.

For the purpose of presenting baseline characteristics in this report, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before enrollment). In addition, treatment group beneficiaries had to enroll in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and therefore varies by participant. The enrollment date is defined as the date on which Ventura County Health Care received a beneficiary's consent to enter the program. After we excluded individuals who did not meet the above criteria, a total of 416 participants were included in the analysis of baseline characteristics for this report.

The CATCH program comprises a group of high-need participants (Table 2). Just over half of them (51 percent) are younger than 65, and more than half (56 percent) are male. Three-quarters of the participants are white. Hispanics represent the next-largest ethnic group at 13 percent. Eighty percent of the FFS participants are Medicare and Medicaid dual eligibles—more than four times the share in the general Medicare FFS population (18 percent)—which indicates a high level of economic need. CATCH participants also have substantial health care needs. The FFS participants are twice as likely as their counterparts in the general Medicare population to have become eligible for Medicare because of a disability (66 percent versus 34 percent, respectively). Furthermore, the average hierarchical condition categories (HCC) risk score for CATCH Medicare FFS beneficiaries is 58 percent above the average score for Medicare FFS beneficiaries nationwide.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 416)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	214	51
65 to 74	125	30
75 to 84	58	14
85 and older	19	5
Gender		
Female	182	44
Male	234	56
Race		
White	316	76
Black	14	3
American Indian, Alaska Native, Asian/Pacific Island American, or other	25	6
Hispanic	58	14
Original reason for Medicare eligibility		
Old age and survivor's insurance	141	34
Disability insurance benefits	273	66
End-stage renal disease (ESRD)[a]	2	0.48
Hospice[b]	1	0.24
Medicare/Medicaid dual status, percent dual[b]	331	80
HCC score[c]		Statistic
Mean		1.58
25th percentile		0.69
Median		1.18
75th percentile		2.11

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary consented to participate in the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Table 3 shows the HCC COPD diagnosis (HCC 111) from claims over the baseline year and COPD stage for those participants for whom a stage has been assigned.[3] The COPD stage indicates the severity of the condition, with COPD stages 1 through 4 assigned from the result of a spirometry test. The presence of a COPD diagnosis in the baseline year can distinguish previously diagnosed participants from those who were diagnosed with COPD as a result of the program. The diagnosis is critical for identifying a comparison group because participants will be matched on the basis of having a COPD diagnosis and comorbidities that we find to be related to the COPD stages. Two-thirds of participants (66 percent) have been assigned a COPD stage, with the remaining third at risk of COPD (stage 0). Through smoking cessation programs and case management, the CATCH program hopes to prevent COPD for at-risk participants. For those with a spirometry test indicating COPD, one-half have low or moderate severity COPD (stages 1 and 2). Of these participants, just over half (54 percent) had an HCC COPD diagnosis prior to enrollment, with the remainder appearing to be newly diagnosed. Those having severe or very severe COPD (stages 3 and 4), on the other hand, predominantly show a history of COPD, with 86 percent having a COPD diagnosis prior to enrollment.

The substantial health care needs of CATCH participants are reflected in the high level of their health care expenditures and utilization. Table 4 shows a common set of utilization and cost measures, including core measures from the Center for Medicare & Medicaid Innovation (CMMI). Because COPD exacerbations often lead to emergency department (ED) visits and inpatient stays, Ventura County Health Care is seeking to lower the risk of exacerbations through improved care under the CATCH program and, in turn, to lower health care utilization among COPD patients. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM)[4] Medicare expenditures in total and by major types of services. The total average PBPM Medicare expenditure during the baseline year was $1,262—about 60 percent above the 2014 national average for Medicare FFS beneficiaries of $792.[5] The average PBPM Medicare expenditure in the baseline year ranged from an average of $851 in the first quarter to $1,498 in the fourth quarter. Over the four quarters, there was a general increase in the intensity of services. Medicare expenditures for inpatient services ($542 PBPM) were the largest driver of the total cost of care for participants, followed by expenditures for physician services ($288 PBPM) and outpatient services ($186 PBPM).

[3] All participants are given a spirometry test and a COPD stage, but there can be a lag for participants in receiving the test or the stage.

[4] Months referred to in our calculations are 30-day periods rather than calendar months.

[5] Except for ambulatory observation stays, the national cost and utilization data here and in the next paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File. New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

Table 3. COPD stage by baseline year COPD diagnosis (HCC 111)

	HCC 111 (chronic obstructive pulmonary disease) = 0				HCC 111 (chronic obstructive pulmonary disease) = 1					
	Frequency	Percentage	Percentage of stage	Percentage of HCC category	Frequency	Percentage	Percentage of stage	Percentage of HCC category	Total frequency	Total percentage
Stage										
0	46	24.21	71.88	54.76	18	9.47	28.13	16.98	64	33.68
1	8	4.21	53.33	9.52	7	3.68	46.67	6.60	15	7.89
2	21	11.05	43.75	25.00	27	14.21	56.25	25.47	48	25.26
3	6	3.16	13.04	7.14	40	21.05	86.96	37.74	46	24.21
4	3	1.58	17.65	3.57	14	7.37	82.35	13.21	17	8.95

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The HCC software used to create the baseline HCC score is used to identify participants with COPD diagnoses in the baseline year. This indicator uses HCC logic for classifying COPD but does not use the hierarchical component, which would limit the classification to those without any higher order conditions.

Table 4. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	416	403	407	415	416
Average Medicare expenditures PBPM[a]					
Total	1,262 (108)	851 (97)	1,487 (275)	1,199 (147)	1,498 (148)
Acute inpatient	542 (69)	286 (60)	708 (192)	530 (99)	635 (93)
Inpatient other[b]	57 (19)	60 (30)	130 (71)	8 (6)	32 (12)
Outpatient[c]	186 (23)	153 (19)	204 (37)	163 (24)	225 (30)
Physician services	288 (24)	242 (23)	302 (41)	293 (37)	315 (28)
Home health	78 (10)	52 (12)	42 (11)	81 (16)	136 (22)
Skilled nursing facility	86 (20)	38 (21)	81 (34)	97 (40)	127 (45)
Hospice	1 (1)	1 (1)	0 (0)	0 (0)	5 (5)
Durable medical equipment	22 (3)	19 (4)	19 (4)	26 (5)	25 (4)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	518 (57)	321 (67)	514 (82)	537 (94)	692 (93)
Outpatient ED visits	1,112 (101)	873 (125)	1,067 (150)	1,093 (154)	1,404 (178)
Observation stays	128 (23)	100 (40)	109 (35)	98 (30)	202 (47)
Primary care visits in any setting	7,466 (335)	5,952 (332)	6,767 (416)	7,728 (589)	9,337 (528)
Primary care visits in ambulatory settings	5,777 (229)	5,260 (290)	5,216 (299)	5,757 (317)	6,837 (337)
Specialist visits in any setting	9,420 (572)	8,903 (635)	8,724 (694)	9,279 (797)	10,731 (768)
Specialist visits in ambulatory settings	7,233 (435)	7,247 (518)	6,501 (459)	6,733 (510)	8,423 (577)

Table 4 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Measures of any health care utilization					
Percentage with a hospital admission[d]	28 (2)	7 (1)	10 (2)	9 (1)	14 (2)
Percentage with an outpatient ED visit[e]	43 (2)	15 (2)	17 (2)	16 (2)	21 (2)
Percentage with an observation stay[f]	10 (1)	2 (1)	2 (1)	2 (1)	5 (1)
Percentage with a 30-day readmission among all discharges	18 (3)	11 (6)	17 (6)	22 (6)	18 (5)
Percentage of participants with a readmission among all participants	5 (1)	1 (< 0.5)	1 (1)	2 (1)	2 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures were calculated from all claims for each participant with at least one eligible day during the baseline year or any baseline quarter. These measures are means for the individuals in the analysis sample, not institutional means.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter. This measure is not a Center for Medicare & Medicaid Innovation priority measure for monitoring and evaluation.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; PBPM = per beneficiary per month

In the baseline year, the annual inpatient hospitalization rate of 518 per 1,000 beneficiaries was well above the national rate of 274 inpatient hospitalizations per 1,000 beneficiaries in 2014. Eighteen percent of participants were readmitted within 30 days of being discharged, nearly identical to the national rate for all Medicare FFS inpatients. The CATCH program specifically targets this outcome by requiring participants to be contacted immediately by a staff registered nurse or respiratory therapist after a discharge and to visit a primary care provider within seven days. In the baseline year, the rate of 1,112 ED visits that did not lead to a hospitalization per 1,000 participants was two and a half times the 2014 national Medicare FFS rate of 454 per 1,000 beneficiaries. The annual observation stay rate of 128 per 1,000 participants was just over double the observation stay rate of all Medicare FFS beneficiaries in 2013 (60 per 1,000 beneficiaries).[6] Twenty-eight percent of CATCH participants had at least one hospitalization during the year before enrollment, 43 percent had an ambulatory ED visit at least once, and 10 percent had at least one observation stay. Other than inpatient and outpatient utilization, CATCH participants were more likely to visit specialists than primary care providers—9,420 specialty visits per year per 1,000 participants compared with 7,466 primary care visits per year per 1,000 beneficiaries. Through improved care coordination, Ventura County Health Care expects to see a decline in the use of specialty services and a potential increase in the use of primary care. Over the course of the four baseline quarters leading to enrollment, we observed an upward trend in average PBPM total payment and average PBPM payments for inpatient, outpatient, and physician services. We observed a similar trend in rates of hospitalizations, outpatient ED visits, observation stays, and specialty services. These trends indicate that beneficiaries targeted for CATCH were high-cost, frequent users of acute care during the year before enrollment but that they were also extremely high-cost, frequent users of acute care services in the quarter immediately before enrollment. This trend has important implications for selecting a comparable cohort of Medicare FFS beneficiaries as the comparison group.

COPD symptoms can lead to inpatient stays and ED visits. Table 5 presents rates of both for patients with a principal diagnosis of COPD or a principal diagnosis of respiratory failure and a secondary diagnosis of COPD. With an annualized rate of 103 stays per 1,000 beneficiaries, COPD-caused inpatient stays constitute about one-fifth of all inpatient stays for CATCH participants. COPD-caused ED visits made up a smaller share of all ED visits for participants but still represented a substantial level of utilization, given the rate of 160 visits per 1,000 enrollees. The CATCH program is expected to reduce the likelihood of exacerbations and, in turn, of ED and inpatient utilization.

[6] See MedPAC, "A Data Book: Health Care Spending and the Medicare Program," June 2015.

Table 5. Measures specific to Ventura County Health Care

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Q1 (10 to 12 months before enrollment)	Q2 (7 to 9 months before enrollment)	Q3 (4 to 6 months before enrollment)	Q4 (1 to 3 months before enrollment)
Total number of enrollees	416	403	407	415	416
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions with principal diagnosis of COPD or respiratory failure with COPD	103 (22.41)	40 (19.83)	79 (30.93)	98 (40.85)	192 (50.06)
Outpatient ED visits with principal diagnosis of COPD or respiratory failure with COPD	160 (33.08)	151 (53.14)	168 (46.54)	127 (34.4)	192 (56.99)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

COPD = chronic obstructive pulmonary disease; ED = emergency department

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 6: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 6. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Ventura County Health Care

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	594
Projected Medicaid population with 6 months of program exposure	576
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	2,219
Likelihood of all-cause hospitalizations	1,885
MDE sample size requirement to detect 20% effect	
Total expenditures	555
Likelihood of all-cause hospitalizations	471
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Questionable, moderate rate of identification of treatment group with claims with some dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff, clinician, and beneficiary surveys
Implementation data that will be analyzed	None

DDB = difference-in-differences Bayesian

We expect to conduct a rigorous impact evaluation by using difference-in-differences estimation with matched comparison groups of Medicare and Medicaid adults who have a diagnosis of COPD. We will derive comparison groups that are similar in terms of medical, payer, and demographic information. We will select a propensity score matched comparison group of beneficiaries residing in two counties north of Ventura County—San Luis Obispo and Santa Barbara counties—by using their claims history to match the patterns of COPD-related diagnoses and care observed in claims for the treatment group. A significant challenge for the evaluation is matching the comparison group with the intervention group on the stage of COPD. Currently, about one-half of the treatment group does not have a COPD stage in the data provided by the awardee. Further, one-third of treatment beneficiaries do not have COPD but are at risk of developing COPD. Although ICD-10 coding will help with matching based upon COPD stage, it may not be possible to develop a solid comparison group of beneficiaries matched on risk of COPD. This may result in fewer beneficiaries who are available for analysis and may affect our ability to detect a 20 percent reduction in total expenditures.

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V. NEXT STEPS

A. Implementation evaluation

As Ventura County Health Care enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

In 2017, we will continue to produce baseline statistics for Ventura County Health Care's Medicare FFS enrollees. We expect to also include baseline statistics for Medicaid beneficiaries as Medicaid managed care encounter data become available. In addition, we will continue to examine the presence of common comorbidities associated with COPD and how these comorbidities relate to the COPD stages. This information will be used to identify a comparison group that possesses similar distributions of COPD diagnoses and related comorbidities.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, care coordinators, health coaches, social workers, paramedics, pharmacists, health IT staff, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.

- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians, dentists, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, which is scheduled to be launched in March 2017.

- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, which is scheduled to be launched in May 2017.

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APPENDIX B.36.

VILLAGE CENTER FOR CARE

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MATHEMATICA Policy Research

REPORT

APPENDIX B.36

HCIA Round Two Evaluation: Village Center for Care

August, 2017

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FIGURE

I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of Village Center for Care's Rango program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on VillageCare's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare and Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has VillageCare made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has VillageCare addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of VillageCare's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of Rango (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries and Medicaid enrollees (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

VillageCare, a community-based nonprofit organization in New York City, has used funding from HCIA R2 to create and implement the Rango program. Rango provides support to HIV-positive participants via an integrated mobile platform (Rango.net) and a mobile app, which were designed to improve adherence to HIV treatment. Key program characteristics are shown in Table 1. Rango promotes participant engagement in care and disease self-management through features that include appointment and medication reminders, discussion boards, private messaging, friend requests, a library of self-help articles, live chat with health coaches, and a searchable database of community social services and supports. Health coaches work to engage participants by (1) providing general information about health, wellness, and treatment adherence; (2) developing and delivering targeted health content; (3) hosting monthly wellness challenges; (4) promoting events and discussions; and (5) encouraging participants to think about their health. Participants are enrolled for a period of 12 months. After the 12 months, they may continue using most of Rango's services, but they will no longer receive incentives or appointment and medication reminders via text message (although they can receive reminders via the Rango app).

To be eligible for the program, a patient must (1) be at least 18 years old; (2) be diagnosed with and prescribed medication for HIV/AIDS; (3) be entitled to Medicare or Medicaid; (4) live in New York City or the surrounding areas (including the Bronx, Brooklyn, Manhattan, Queens, and Staten Island, as well as Nassau, Suffolk, and Westchester counties); and (5) consent to participate in the program. VillageCare has partnered with several payer, provider, and community-based organizations that work with HIV-positive populations in order to help with participant recruitment. Rango participants are referred to the program by partner organizations and through word of mouth. They are also recruited by program liaisons, who are stationed at VillageCare and at partner organizations.

VillageCare leaders conceived of Rango as a commercial product that health care organizations would pay to use with a per beneficiary per month (PBPM) service fee (applied to all members enrolled in Rango), after the HCIA R2 cooperative agreement ends. They are currently working to determine (1) what the PBPM service fee would need to be to cover Rango's costs and (2) how much health care organizations would be willing to pay for it.

VillageCare aims to enroll and engage 5,036 participants in its platform by the end of the three-year cooperative agreement. The awardee's expected outcomes for Rango include (1) increasing participants' retention in HIV/AIDS care; (2) supporting treatment adherence; (3) increasing participants' time in first-line (that is, least burdensome and least costly) HIV/AIDS treatment; and (4) reducing costly hospitalizations and outpatient services associated with treatment failure.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by VillageCare during the first year of its cooperative agreement.

- VillageCare engaged a variety of recruitment partners that were already invested in HIV treatment adherence and were enthusiastic about their patients being able to use Rango for education and support.
- VillageCare developed and launched Rango on time by making use of a one-month cushion built into the schedule.
- VillageCare met its Year 1 enrollment target, while disenrollment was lower than expected.

We also identified several initial challenges in implementing the program and VillageCare's strategies for addressing them.

- VillageCare helped to pay participants' cell phone bills as an incentive to participate in Rango, but staff reported that these payments were more labor intensive to manage and more expensive than originally anticipated. VillageCare responded by limiting the number of approved cell phone carriers and by reducing the payments from $40 per month to no more than $35 per month.
- Program liaisons struggled to enroll new participants in a timely fashion due to the large number of interested people, the length of the initial enrollment process, the number of no-shows for enrollment appointments, and competing demands to deliver customer service. VillageCare streamlined the enrollment procedures and reduced the use of enrollment appointments to free up program liaisons' time.

Finally, we identified several early lessons learned by VillageCare in implementing its program.

- The rapid development of the Rango platform was facilitated by using technical vendors who had pre-existing tools and by allowing the lead technical vendor significant latitude in coordinating the process.
- VillageCare's devotion of resources to customer service has helped to maintain commitment and satisfaction from program participants.
- Cell phone payments have been a very effective incentive to encourage participation in the program, but they have also been more expensive and labor-intensive to administer than anticipated.
- VillageCare has been responsive to feedback. This has led to improvements in the program, but has also made it challenging for staff and partner organizations to keep up with the frequent changes.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, VillageCare made progress in the following areas:

- VillageCare continues to meet its overall enrollment targets, but enrollment has plateaued at some referral sites. VillageCare has taken several steps to address reduced enrollment, including adding referral partners and recruitment sites.

- Program participants continued to make use of the Rango platform, including its discussion forums, library of resources, and medication reminders. Rango staff continued to (1) provide customer service support, (2) support and engage participants, and (3) refine Rango's offerings based on participant feedback.
- VillageCare had several meetings with its payer partners regarding the payment model. The lack of outcome data has slowed payment model development, but VillageCare hopes to have outcome data in the fall.

Over the past year, VillageCare also made several changes to its program.

- VillageCare released Phase 2 of the Rango platform, which includes the following updates: (1) live chat with health coaches (one-on-one and group sessions), (2) a Rango app for iPhone and Android, (3) appointment reminders via SMS text messaging or app notifications, (4) the Healthify social services database, and (5) enhanced communication features on the home page for program announcements and calls to action. The platform no longer includes a peer mentoring feature.
- VillageCare changed the participant incentive from a $35 monthly contribution to participants' cell phone plans to a $35 monthly gift card to CVS or Target.
- Several staffing changes have occurred. Most notably, the project director and a manager left VillageCare. Their duties were assumed by other Rango management staff. Interviewees felt that the project was running more smoothly under the new leaders.
- Starting in May 2016, VillageCare began to graduate participants who had been enrolled in Rango for 12 months.

Below we note the key challenges that VillageCare has worked to address in the second year of its cooperative agreement, including the internal and external factors that have influenced the awardee's ability to address these challenges.

- VillageCare has struggled to meet participants' high demand for customer support. The awardee has taken numerous steps to try to reduce this demand, including changing participant incentives and improving communications with participants about the program and any changes being made.
- Utilization of some Rango features has been lower than anticipated. VillageCare is continuously seeking ways to modify the features to increase their appeal to participants and to better promote them.
- Some participants are motivated to join the program primarily by the incentive. These participants may be likely to drop out once they graduate and are no longer eligible for the incentive. Frontline staff are working to increase participant awareness of the different features that Rango offers, with hopes that some of those who enroll primarily for the incentive discover that Rango is useful to them and continue to participate after the incentive ends.

As VillageCare enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- VillageCare will need to demonstrate that Rango has an impact on health outcomes in order for potential partners to be interested in paying for the program in the future. VillageCare has contracted with some partner organizations to evaluate the effects of Rango using the partners' outcomes data.
- Preliminary feedback on VillageCare's PBPM price for Rango indicated that the price was more than organizations would be able to afford. VillageCare will need to determine how to make the price more affordable while maintaining the effectiveness of the program.
- Rango has the potential to be applied to other chronic health conditions such as diabetes, which could be a possible avenue for program expansion.

Table 1. VillageCare: Rango characteristics at a glance

Program characteristic	Description
Purpose	Technology-based program to improve adherence to HIV/AIDS treatment through the use of an integrated mobile platform and a mobile app
Components	• Patient engagement. Rango supports self-management of HIV/AIDS and associated conditions • Health information technology. Mobile platform and app with educational, motivational, and reminder features
Target population	Participants age 18 and older diagnosed with and prescribed medication for HIV/AIDS; living in New York City and the surrounding areas; and covered by Medicaid, Medicare, or both (dual eligible). Most current participants are Medicaid only.
Theory of change/theory of action	Participants' use of electronic self-care tools will improve their adherence to HIV treatment and their engagement in and satisfaction with their care. In this way, VillageCare anticipates that Rango will reduce the costs associated with treatment failure and eliminate the need for more burdensome and expensive therapies.
Payment model	Capitated payment
Award amount	$7,983,297
Launch date[a]	4/1/2016
Setting	• Recruitment at partnering community-based organizations, payer sites, and primary care provider locations • Services delivered through Rango platform
Market area	Urban
Market location	New York City and surrounding areas—including the Bronx, Brooklyn, Manhattan, Queens, and Staten Island, as well as Nassau, Suffolk, and Westchester counties
Outcomes	• Adherence to treatment • Participant engagement • Participant satisfaction

[a]After the initial planning period, the awardee's program began to operate as of this date.

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by VillageCare in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 20 through June 23, 2016. For the analyses of VillageCare's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- The project director and two other management staff members
- Four frontline staff members (two health coaches and two program liaisons)
- Representatives of two partner organizations responsible for participant recruitment

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertained to the research questions identified in Section I.B.

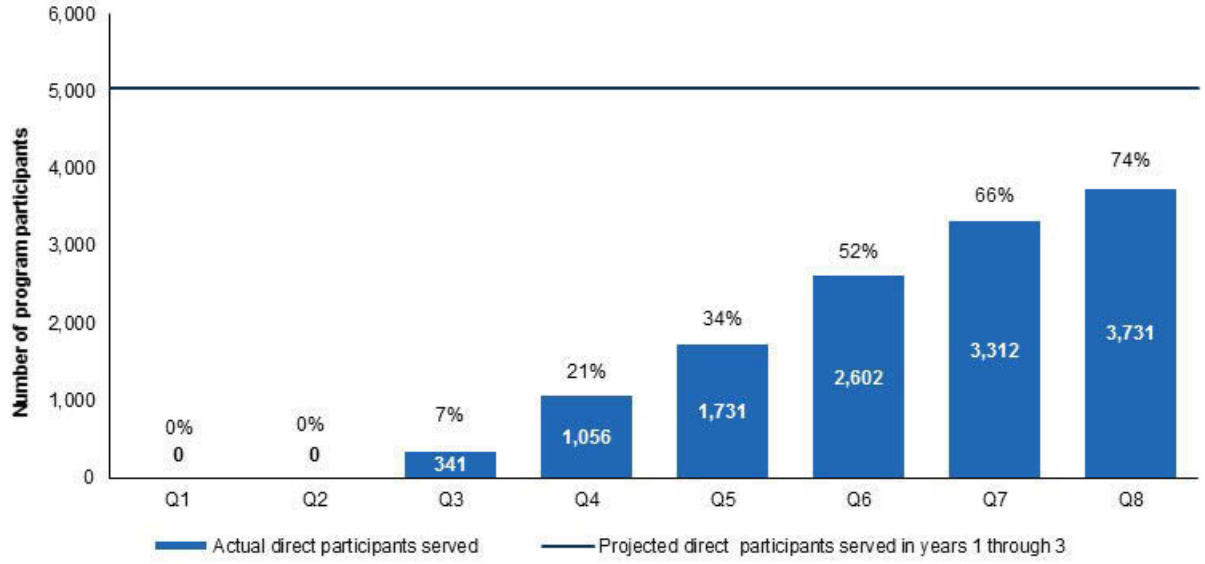
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on VillageCare's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

VillageCare reported to the implementation and monitoring contractor that it directly served 3,731 participants from April 2015 (when it launched its program) through August 2016, which represents about 74.1 percent of its 5,036 projected direct participants (Figure 1).

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. VCC does not have indirect program participants.

VillageCare's progress in meeting its three-year enrollment goal was influenced by several factors.

> "There is something about a cell phone payment that really hit a nerve with our target population. One of their top financial concerns is how to pay their cell phone bill every month, and the fact that we were offering to contribute towards that bill was a huge, huge draw."
>
> *— Program leadership*

An important contributor to VillageCare's recruitment success was the provision of a $35 monthly participant incentive. For most of the first year of implementation, VillageCare provided this incentive in the form of a monthly contribution to participants' cell phone plans, which was especially attractive to participants. However, paying the incentive as a contribution to a cell phone plan turned out to be very complicated logistically, creating a large burden for staff to manage and leading to significant frustration among participants (which in turn led to a high volume of customer service calls). For these reasons, VillageCare changed the incentive to a $35 electronic gift card that participants receive via text message. Although the gift card is not quite as attractive as the phone payment, it is still a powerful incentive. VillageCare

staff noted that having an incentive may be especially useful for recruiting patients who are less motivated but perhaps most in need of the program.

Changing to gift cards as the incentive has had several advantages. First, the gift cards are easier to process and to track. Second, participants are able to access the funds within one or two days of the disbursement date, instead of waiting up to a few weeks for the cell phone payments to be credited by the carrier. Third, interviewees noted that the primary focus of Rango was sometimes overshadowed by the cell phone payment—that some participants thought of it as "the program that pays your phone bill." With gift cards as the incentive, it is easier for participants to understand that the program is about more than the incentive.

However, the change to gift cards has also had some drawbacks. The gift cards are harder for participants to use and do not meet a basic need for participants the way the phone payment did. The perceived lower value of the new incentive may have led some participants to disenroll and may have made attracting new participants more difficult. One interviewee thought that cash would have been a better incentive. To address these problems, VillageCare is using the Rango platform to educate participants on how to incorporate the gift cards into their budgets and direct savings towards their phone bills. VillageCare is also providing support for problems with the gift cards, such as how to recover them when participants accidentally delete them or when they change phones.

Enrollment has plateaued at some referral sites. Because some sites see the same clients every day, VillageCare hit a point where staff had already approached everyone who was eligible. To maintain enrollment levels, VillageCare is working on establishing additional referral resources through partnerships with other organizations and is adding new sites within existing partner organizations. After enrollment plateaus at a site, VillageCare has also found that it can get new enrollees if it pulls out for a few months and then returns.

Enrollments were suspended at one of VillageCare's partners, the Mount Sinai Medical Center, between July 13 and September 29, 2016, to implement a corrective action plan issued by Mount Sinai. The corrective action plan addressed deviations from proper enrollment procedures for a small number of participants referred from Mount Sinai clinics. These deviations were identified by a Mount Sinai researcher and included participants who were not HIV positive, were not Mount Sinai patients, or were enrolled using the VillageCare informed consent form rather than the Mount Sinai informed consent form.

VillageCare has continued to work to streamline the enrollment process, which was inefficient and limited the number of people that could be enrolled. Previously, the enrollment process was primarily by appointment, which was inefficient because the no-show rate for appointments was very high. In addition, program liaisons provided new participants with a lot of guidance during the enrollment process, including a full demonstration of Rango's features, which was time-consuming. The new process involves fewer enrollment appointments and more on-the-spot enrollments (e.g., enrolling people the program liaisons find in the waiting rooms of partner organizations). The enrollment process is also more self-guided now, with the program liaisons giving only a very brief demonstration of Rango. Frontline staff noted that one drawback to the new approach is that, without the full demonstration, some participants are not clear which Rango features they might want to use. They have the option of making an appointment for a full

demonstration, but participants do not always do this, or they may take too long to make an appointment and run the risk of being disenrolled from the program if they do not use any of the program features within a specified time.

Program liaisons are faced with the competing demands of recruiting new participants and assisting existing participants. VillageCare has instructed the program liaisons to prioritize enrollment and to direct customer service questions to the customer service phone number, but that approach is not always satisfactory for the participant. If the program liaison is on site, the participant wants help right away. VillageCare and the program liaisons have brainstormed about how to handle this. VillageCare has also tried numerous strategies to reduce customer service problems, in particular changing the incentive from cell phone payments to gift cards, and working to improve communications with participants.

B. Implementation of the service delivery model

VillageCare continues to support program participants' health and social well-being through a variety of features and services. Medication reminders have been an especially popular feature. Some participants also make wide use of other features, including discussion forums, wellness challenges, articles about various health topics, and communication with health coaches. Phase 2 of Rango, which was rolled out in Year 2, included some new features and the Rango app. In May 2016, participants who had been enrolled for 12 months began to graduate from the program, meaning that they could continue to receive all of the services except medication reminders via text message and the monthly participant incentive.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

Characteristics of the Rango platform have created both advantages and challenges in terms of program implementation. Program staff reiterated that the anonymity of Rango has provided participants an opportunity to share things that they may not have felt comfortable

> "I think people get a lot of value out of [the social network aspect of Rango]. We see people posting on forums [that] they haven't disclosed [their HIV status] to anyone in their life; they really have no one to talk to about this. So that kind of anonymous secure community I think is unusual and special."
>
> *— Program leadership*

doing in another forum. For example, because some participants have not disclosed their HIV-positive status to anyone in their lives, Rango provides them a space to share freely about their feelings and experiences related to HIV. Some participants also share difficult, personal stories about their lives. This sharing has allowed participants to support each other and form relationships.

The new Rango app has advantages for both program participants and VillageCare. For participants, one important advantage is that they do not need to remember their log-in credentials to use it: difficulty remembering usernames and passwords has been a significant barrier to participants' use of the website. In addition, having the app helps to increase use of Rango because it is a visual reminder on their phones. The app's push notifications have several advantages over text messaging, including being cheaper to send than text messages and not being blocked as spam by phone carriers. For participants who are graduating from the program, push notifications are a means by which they can continue to receive medication and appointment reminders. Push notifications also provide a mechanism for VillageCare to promote Rango's features or encourage participant use.

VillageCare has continued to make changes to the Rango platform (for example, the addition of live chat and of the Rango app) as well as to the program's procedures (for example, changes to the incentives and to the processes by which participants are enrolled). Although these changes have been necessary for addressing problems and for refining and improving the program, keeping up with the changes has been challenging for staff, partner organizations, and participants. VillageCare has worked on improving its communications with partner organizations and participants to give them more advance notice of changes and to communicate the changes more clearly. VillageCare has also increased training so that staff are updated on the changes.

2. Implementation processes

During the second program year, VillageCare worked to reduce demands for customer service and to increase utilization of underused features of the Rango platform. The demand for customer service has continued to be high, leading to frustration among participants (if they cannot get a timely response to problems), causing a burden for partner organizations (if participants come back to them for help), and straining human resources at VillageCare. VillageCare has taken several steps to try to reduce the demand for customer service, including the change in participant incentives from cell phone contributions to gift cards (as discussed in the enrollment section). In the short term, the change in the incentive generated confusion among participants and new demands for customer service, but interviewees thought that this demand had begun to abate after the transition was complete. VillageCare has also worked to improve how it communicates information about the program and program changes with participants in an effort to reduce confusion and questions. It has found that text messages are more effective than mail, email, or robocalls, and that messages need to be repeated several times. VillageCare has also provided more training to frontline staff on the platform, customer service, and client relations so that they are better able to respond to participants' questions and concerns.

Utilization of some features has been lower than hoped, at least at first. VillageCare's expectation from the beginning was that it would try out an array of features to see which ones worked well, and drop the ones that did not work well. The team is continuously monitoring

utilization of the different features and developing strategies to increase usage. For example, in November 2015, VillageCare started conducting month-long wellness challenges—workshops on specific health-related themes such as smoking cessation or managing your blood sugar. Participation in the first wellness challenge was low. Based on feedback from those who did participate in the challenge, VillageCare modified subsequent challenges to give participants more options in terms of both the goals and the mechanisms through which they could participate (for example, through discussion boards). Similarly, participants have so far not used the live chat feature as much as staff had expected. To promote it, VillageCare has integrated live chat into the wellness challenges. In addition, VillageCare has implemented a pop-up box that appears on the home page, asking participants if they would be interested in chatting with a health coach. VillageCare has also dropped some features (namely, peer mentoring and video support groups) because they continued to have low levels of participation despite VillageCare's efforts to increase their appeal.

> "That's made a huge difference, having people that are really dedicated to the program and are good business operations people."
>
> *— Partner organization*

Interviewees generally felt that the changes in the project leadership that occurred in the past year have improved the functioning of the project. Representatives from a partner organization noted that communication had improved and that problems had been addressed more quickly with the new leaders. In addition, turnover among frontline staff has stopped. Some frontline staff members said that they have more effective working relationships with their current supervisors than they did with their past supervisors and that they are getting more of the training and support that they need.

3. Organizational and external context

External factors related to participant motivation, availability of technology-related human resources, cell phone turnover and spam filters affected program implementation. Some participants are motivated to participate in Rango primarily by the monthly incentive. These participants may be likely to disenroll from the program once they graduate and are no longer eligible to receive the incentive. Frontline staff have worked to increase participants' awareness of how Rango's features might benefit them so that even participants who enrolled only for the incentive might decide to continue with the program after the incentive ends. Participants who are least engaged in their treatment are those who have the greatest need for the kind of support that Rango provides. However, these same participants are most likely to be motivated primarily by the incentive. The health coaches make a special effort to reach out to participants who have low scores on the Patient Activation Measure to encourage their participation in the wellness challenges and other features.

A lack of human resources at the vendor responsible for developing the Rango app led to a significant delay in the rollout of the app. One interviewee commented that app developers are expensive and hard to come by.

Participants frequently change phones. When they do, they no longer receive text messages (including the monthly incentives) and have to reinstall the app on their phones. One interviewee said that a lot of participants get free phones for two months and then switch phones. VillageCare often finds out that participants have changed phones when its text messages start to be rejected. If VillageCare has an alternate phone number or an email address for the

participants, staff will reach out to them to try to get their new phone number; otherwise, VillageCare has to wait for participants to call to get reconnected. Participants also have to reinstall the app when they get a new phone. This can be complicated because they need their username and password to do this, and they often do not have that information anymore. Participants can call customer service to get help, but the turnaround time for staff to get back to them can be lengthy.

Cell phone carriers will sometimes block medication reminders sent via text message because they look like spam. The medication reminders are the same message sent at the same time every day, thousands at a time, and this looks like spam to a lot of filters. If a participant says they are not getting their messages, VillageCare will investigate. If it turns out the carrier is blocking the messages, VillageCare will notify the text messaging vendor, who will change the number they are sending from. This will allow the messages to go through again. However, it is a constant effort to refresh the numbers often enough to stay ahead of the carrier. This is not a problem when participants use the app for their medication reminders.

C. Development of the payment model

Progress on the payment model has been slow because VillageCare does not yet have any outcome data. Potential payers are not prepared to discuss what they might be willing to pay for Rango without evidence regarding potential health improvements for participants. To produce some outcome data, VillageCare contracted with two partners to assess Rango's impact on clinical outcomes by combining VillageCare data on participant utilization of Rango with the partners' data on the same participants' clinical outcomes. VillageCare was expecting to have the results of these analyses in the fall of 2016.

VillageCare shared with some partners an initial PBPM estimate for a fully staffed version of Rango and received feedback that the cost was more than they would be able to afford. As a result, VillageCare has repriced the PBPM as a software service without any staffing (purchasers could staff the program themselves). The awardee plans to get feedback on this new price. However, some interviewees expressed the view that the health coaches are a fundamental component of Rango and that the intervention would not function the same without them.

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IV. FINDINGS FROM ANALYSIS OF MEDICARE AND MEDICAID ENROLLMENT AND CLAIMS DATA

This section includes a summary of both core and awardee-specific claims-based outcomes at baseline. For the purpose of our evaluation, the treatment group consists of beneficiaries who are in Medicare fee-for-service (FFS), Medicaid FFS, or Medicaid managed care and who were enrolled in Rango (according to lists from the awardee) at some point between its start in April 2015 through June 30, 2015 (for Medicaid enrollees) or through May 31, 2016 (for Medicare FFS enrollees). The Medicaid analysis is limited to beneficiaries enrolled through June 30, 2015, as opposed to May 31, 2016, due to the lag in Medicaid data. Medicare managed care beneficiaries were excluded from the analysis due to lack of data availability.

VillageCare began to enroll Medicare and Medicaid beneficiaries into the Rango program in April 2015. As of the end of May 2016, the program had 3,312 participants. Baseline characteristics are presented separately for Medicare FFS beneficiaries versus Medicaid beneficiaries in Sections A and B below, respectively.

A. Baseline characteristics of the treatment group: Medicare FFS beneficiaries

In presenting the baseline characteristics for Medicare FFS beneficiaries, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent participants. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded patients who did not meet the above criteria, 312 Medicare FFS participants (out of 753 total Medicare participants, FFS and managed care, enrolled through May 31, 2016) were included in the analysis of baseline characteristics for this report. The vast majority of the Medicare beneficiaries excluded from the analysis were in Medicare managed care in their month of enrollment.

The Medicare FFS beneficiaries participating in the Rango program are fairly typical of HIV/AIDS patients nationwide[3] in terms of demographics and health status characteristics (Table 2). The most common characteristics of participants include being younger than 65 (85 percent); male (68 percent); black (59 percent); originally entitled to Medicare through disability (89 percent, relative to a national average of 24 percent); and dually eligible (63 percent, relative to a national average of 18 percent). A less common characteristic is originally being entitled to Medicare through end-stage renal disease (ESRD) (4 percent). None of the participants are enrolled in hospice. Their mean hierarchical condition category (HCC) risk score is 1.6, relative

[3] As in our sample, black and Hispanic populations nationwide include high proportions of people with HIV. See http://www.cdc.gov/hiv/statistics/overview/ataglance.html. In addition, most HIV/AIDS patients nationwide are younger than 55. See http://www.cdc.gov/hiv/group/age/olderamericans/index.html.

to a national mean risk score of 1.14 in calendar year 2014 among beneficiaries younger than 65.[4] Their median risk score is 1.36, with a 25th percentile risk score of 1.04 and a 75th percentile risk score of 1.92. Taken together, the scores indicate that the participants are substantially sicker than the average Medicare FFS beneficiary.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

	All participants (N = 312)	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
Younger than 65	265	85
65 to 74	45	14
75 to 84	2	1
85 and older	0	0
Gender		
Female	100	32
Male	212	68
Race		
White	69	22
Black	185	59
American Indian, Alaska Native, Asian/Pacific Island American, or other	8	3
Hispanic	50	16
Original reason for Medicare eligibility		
Old age and survivor's insurance	21	7
Disability insurance benefits	279	89
ESRD[a]	12	4
Hospice[b]	0	0
Medicare/Medicaid dual status, percent dual[b]	198	63
HCC score[c]		Statistic
Mean		1.6
25th percentile		1.04
Median		1.36
75th percentile		1.92

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the beneficiary signed up for the program. All beneficiary characteristics were measured during or as of the end of the baseline year.

[4] See https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html.

Table 2 *(continued)*

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category

VillageCare expects the Rango program to reduce total expenditures by 8.6 percent, compared with what they would have been absent the program. The awardee anticipates that the reduction in expenditures will be a result of achieving the program goals, which include (1) improving the engagement and retention of HIV/AIDS patients in care; (2) enabling the development of more timely, tailored interventions to help participants adhere to their HIV medication; (3) increasing participants' time in first-line (that is, least burdensome and least costly) HIV/AIDS treatment; and (4) reducing costly inpatient and outpatient services associated with treatment failure.

Consistent with the high HCC risk scores, participants also have high baseline expenditures and service use (Table 3). We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments, in total and by major types of services.[5] There was an upward trend in quarterly expenditures. The total average PBPM Medicare payment during the baseline year was $1,329, relative to a national average of $855 in 2014 for those younger than 65. The average PBPM Medicare payment was $508 for acute inpatient services (relative to a national average of $322), $384 for outpatient services (relative to a national average of $126), and $334 for physician services.

The service use was high for participants relative to the corresponding nationwide rates for the Medicare population younger than 65. The rate of acute care hospitalizations was 366 per 1,000 Medicare FFS beneficiaries per year, relative to a national average among those younger than 65 of 324 per 1,000 beneficiaries per year during the baseline year; 19 percent of the beneficiaries had at least one hospitalization in the baseline year.[6] The probability of a 30-day readmission was moderate—23 percent per discharge, or 5 percent per participant—compared with the national average of 22 percent per discharge in 2014 for Medicare beneficiaries in this age group. The rate of emergency department (ED) visits was 891 per 1,000 Medicare FFS beneficiaries per year, higher than the national average in 2014 of 789 per 1,000 beneficiaries per year. Forty-four percent of participants had at least one ED visit in the baseline year. The rate of

[5] All national data in this paragraph are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

[6] All national data in this paragraph except for ambulatory observation stays are from the Centers for Medicare & Medicaid Services, "Public Use File; New Data on Geographic Variation." Available at www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Medicare-Geographic-Variation/GV_PUF.html. Accessed February 2016.

ambulatory observation stays was 23 per 1,000 beneficiaries per year, relative to a national average of 58 per 1,000 beneficiaries per year among all Medicare FFS beneficiaries in 2014.[7] At baseline, the rate of primary care visits in any setting was 3,175 per 1,000 Medicare FFS beneficiaries per year; 81 percent occurred in an ambulatory setting. The rate of specialty care visits in any setting was 12,701 per 1,000 Medicare FFS beneficiaries per year; 88 percent occurred in an ambulatory setting.

Table 3. Baseline year expenditures and health care utilization for Medicare FFS beneficiaries enrolled in the awardee's program through May 31, 2016

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees	312	301	308	312	312
Average Medicare expenditures PBPM[a]					
Total	1,329 (129)	1,153 (176)	1,196 (181)	1,410 (212)	1,533 (187)
Acute inpatient	508 (84)	348 (104)	437 (144)	621 (154)	605 (138)
Inpatient other[b]	34 (14)	57 (42)	0 (0)	37 (20)	43 (27)
Outpatient[c]	384 (47)	321 (39)	387 (51)	385 (66)	442 (58)
Physician services	334 (30)	311 (34)	330 (39)	304 (28)	388 (46)
Home health	26 (7)	28 (10)	18 (8)	22 (9)	37 (12)
Skilled nursing facility	22 (18)	38 (29)	15 (15)	28 (36)	5 (5)
Hospice	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Durable medical equipment	21 (10)	49 (41)	9 (3)	12 (4)	14 (5)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions[d]	366 (60)	273 (86)	331 (96)	430 (99)	413 (80)
Outpatient ED visits	891 (117)	928 (160)	927 (168)	795 (149)	917 (147)
Observation stays	23 (10)	41 (30)	13 (13)	26 (18)	13 (13)

[7] MedPAC, "A Data Book: Health Care Spending and the Medicare Program," June 2015.

Table 3 *(continued)*

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Primary care visits in any setting	3,175 (316)	2,797 (332)	2,861 (503)	3,348 (370)	3,667 (361)
Primary care visits in ambulatory settings	2,571 (245)	2,265 (272)	2,265 (252)	2,671 (312)	3,060 (320)
Specialist visits in any setting	12,701 (770)	11,694 (968)	12,317 (926)	13,106 (976)	13,624 (935)
Specialist visits in ambulatory settings	11,189 (713)	10,152 (887)	11,298 (854)	11,125 (808)	12,126 (871)
Measures of any health care utilization					
Percentage with a hospital admission[d]	19 (2)	5 (1)	6 (1)	7 (1)	9 (2)
Percentage with an outpatient ED visit[e]	44 (3)	17 (2)	17 (2)	14 (2)	15 (2)
Percentage with an observation stay[f]	2 (1)	1 (< 0.5)	0 (0)	1 (< 0.5)	0 (0)
Percentage with a 30-day readmission among all discharges	23 (4)	30 (9)	22 (10)	31 (8)	9 (5)
Percentage of participants with a readmission among all participants	5 (1)	1 (1)	1 (< 0.5)	2 (1)	1 (1)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weight every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Total Medicare expenditures for the baseline year or a given quarter were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[b]Inpatient "other" expenditures include the other types of inpatient stays, such as rehabilitation admissions, long-term care hospital services, or psychiatric hospital services.

[c]Includes visits to an ED and a hospital outpatient department, as well as outpatient surgeries.

[d]The hospitalization and readmission measures include acute care hospital admissions and exclude all other types of rehabilitation admissions, long-term care hospital services, or psychiatric hospital services. The number of acute care hospital admissions was calculated from claims data for each participant with at least one eligible day during that quarter.

[e]The percentages shown do not include ED visits that resulted in an inpatient admission.

[f]The percentages shown do not include observation stays that resulted in an inpatient admission.

ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

The trend in utilization over time is mixed. Acute hospital admissions rose over the first three quarters, then fell slightly in quarter 4. On the other hand, there was an overall upward trend in both primary care visits and specialist visits in any setting and in ambulatory settings from quarter 1 to quarter 4. In contrast, ED visits declined in quarter 3 and then rose in quarter 4. Overall, participants had higher expenditures and a higher rate of acute care hospitalizations relative to the national averages for Medicare FFS beneficiaries younger than 65. These findings indicate that there may be the potential for improving the care of participating beneficiaries.

People with HIV/AIDs generally have high rates of mental health and substance abuse problems relative to the general population. In the extreme, these problems may lead to an ED visit and/or to a hospital admission. Table 4 presents two measures specific to VillageCare that relate to mental health and substance abuse. The rate of ED visits for mental health or substance abuse is 30 per 1,000 Medicare FFS beneficiaries per year, whereas the rate of hospital admissions for mental health or substance abuse is 36 per 1,000 Medicare FFS beneficiaries per year.

Table 4. Measures specific to the awardee for Medicare FFS beneficiaries enrolled in the program through May 31, 2016

		Utilization for each quarter in the 12 months before enrollment			
Health care utilization rates (annualized per 1,000)	12 months before enrollment	Q1 (10 to 12 months before enrollment)	Q2 (7 to 9 months before enrollment)	Q3 (4 to 6 months before enrollment)	Q4 (1 to 3 months before enrollment)
Total number of enrollees	312	301	308	312	312
ED visits for mental health or substance abuse—primary diagnosis[a]	30 (11)	27 (19)	13 (13)	26 (20)	52 (26)
Hospital admissions for mental health or substance abuse—primary diagnosis, all hospitals[a,b]	36 (14)	0 (0)	26 (18)	52 (31)	65 (43)

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016.

Note: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as the 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in FFS Medicare during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]The search for mental health and substance abuse diagnoses is limited to the primary diagnosis on the claim.

[b]Unlike the acute hospital admissions measure in Table 3, the measure for hospital admissions for mental health or substance abuse includes rehabilitation, long-term care, and psychiatric hospitals.

ED = emergency department

B. Baseline characteristics of the treatment group: Medicaid beneficiaries

In presenting the baseline characteristics for Medicaid beneficiaries, we included both Medicaid FFS and Medicaid managed care beneficiaries. Similar to the restrictions imposed on the Medicare FFS beneficiaries above, we restricted the treatment group to Medicaid beneficiaries who were enrolled in Medicaid when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they had to have been enrolled in the awardee's program on or before June 30, 2015. After we excluded participants who did not meet the above criteria, 530 Medicaid participants (out of 3,000 total Medicaid participants enrolled through May 31, 2016) were included in the analysis of baseline characteristics for this report. The vast majority of the Medicaid participants excluded from the analysis were those who enrolled after June 30, 2015.

All of the Medicaid beneficiaries included in this analysis were enrolled in Rango in the second quarter of 2015. The most common characteristics of Medicaid participants (Table 5) include being 45 to 54 year old (46 percent), male (69 percent), black (62 percent), eligible for full Medicaid benefits (98 percent), in the eligibility category of supplemental security income (SSI) Blind/Disabled (51 percent), enrolled in a comprehensive managed care plan (72 percent), non-dual eligible (76 percent), not being enrolled through a home and community-based services (HCBS) waiver (98 percent), and having no third-party insurance (98 percent).

In Table 6, we find that the most common Chronic Disability Payment System (CDPS) categories of Medicaid participants include infectious disease (86 percent), psychiatric disorders (49 percent), cardiovascular (43 percent), substance abuse (35 percent), and pulmonary (33 percent). Ninety-five percent of participants are in at least one CDPS category. Although only 86 percent of participants had an infectious disease diagnosis in their claims data in the 365-day baseline period, it is anticipated that all participants will have a diagnosis of HIV/AIDs (an infectious disease) in their claims data at some point in time (that is, either in the baseline period or before the baseline period), because HIV/AIDs is a requirement to qualify for Rango. The high rates of substance abuse (35 percent) and psychiatric problems (49 percent) are consistent with the high rates for these conditions that are found in the HIV/AIDs population nationwide. Participants have a mean risk score of 3.17, a median risk score of 2.91, a 25^{th} percentile risk score of 2.18, and a 75^{th} percentile risk score of 3.94.

Table 5. Baseline year demographic characteristics of Medicaid beneficiaries enrolled in the awardee's program through the first program quarter (June 30, 2015)

	All enrollees (N = 530)[a]	
Characteristics	**Number**	**Percentage**
Age as of enrollment date		
22-34	40	7.55
35-44	79	14.91
45-54	245	46.23
55-64	140	26.42
65-74	26	4.91
Gender		
Female	166	31.32
Male	364	68.68
Race and ethnicity		
White	44	8.30
Black	329	62.08
Asian or Pacific Islander	2	0.38
American Indian, Alaska Native, or other	2	0.38
Hispanic	1	0.19
Hispanic and one or more races	134	25.28
More than one race (not Hispanic)	5	0.94
Type of benefits		
Full Medicaid benefits	517	97.55
Restricted benefits	13	2.45
Medicaid eligibility category		
SSI aged	8	1.51
Non-SSI aged	2	0.38
SSI blind/disabled	268	50.57
Non-SSI blind/disabled	37	6.98
TANF, safety net, or low-income family adults	205	38.68
All other adults	10	1.89
Managed care enrollment		
Comprehensive managed care plan	380	71.70
Long-term care carve out	28	5.28
No managed care enrollment	122	23.02
Medicare/Medicaid dual status, percent dual		
Dual	129	24.34
Non-dual	401	75.66
HCBS waiver enrollment		
Enrolled in any HCBS waiver	9	1.70
Not enrolled in a HCBS waiver	521	98.30

Table 5 *(continued)*

Characteristics	All enrollees (N = 530)[a]	
	Number	Percentage
Third-party insurance		
Third-party insurance	11	2.08
No third-party insurance	519	97.93
Quarter of initial program enrollment		
Q2 2015	530	100
Records included in the expenditure and utilization analysis[b]		
	507	95.66

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of June 30, 2015.

Note: The baseline period is defined as one year (365 days) prior to each individual beneficiary's program enrollment date. Medicaid enrollees must have at least 90 days eligibility in the baseline period and on the date of program enrollment to be included in the eligible sample. All beneficiary characteristics (other than CDPS category and risk score) are measured in the last month of the baseline period.

[a]Excludes Medicaid beneficiaries who have state plan enrollment during the month of program enrollment.

[b]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third party benefits during the month of program enrollment.

HCBS = Home and Community Based Services; SSI = Supplemental Security Income; TANF = Temporary Assistance for Needy Families

Table 6. CDPS categories of Medicaid beneficiaries enrolled in the awardee's program through the First Program Quarter (June 30, 2015)

Characteristics	All enrollees (N = 530)[a]	
	Number	Percentage
Selected CDPS categories[b]		
Beneficiaries in one or more CDPS categories	506	95.47
Infectious disease	455	85.85
Psychiatric	261	49.25
Cardiovascular	229	43.21
Substance abuse	184	34.72
Pulmonary	173	32.64
Beneficiaries not in a CDPS category	24	4.53
CDPS risk score[b]		
Mean	3.17	
25th percentile	2.18	
Median	2.91	
75th percentile	3.94	

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of June 30, 2015.

[a]Excludes Medicaid beneficiaries who have state plan enrollment during the month of program enrollment.

[b]Categories and risk scores are defined using the CDPS software and are based on the ICD-9 codes on Medicaid claims occurring during each beneficiary's one-year baseline period. The five most common conditions among beneficiaries in the sample are reported in this table.

CDPS = Chronic Disability Payment System

Baseline expenditure and utilization statistics for Medicaid participants are presented in Table 7 and Table 8 for non-dual status participants (enrolled in Medicaid only) and for dual status participants (enrolled in Medicare and Medicaid), respectively. Unlike the beneficiary characteristics presented in Tables 5 and 6, the expenditure and utilization analysis presented in Tables 7 to 9 excludes Medicaid beneficiaries who have partial benefits or third-party benefits during the month of program enrollment (as well as those who have state plan enrollment).

In Table 7, we find that the total average PBPM Medicaid payment among Medicaid non-dual status participants during the baseline year was $5,445. The average PBPM Medicaid payments for non-dual status participants were $368 for acute inpatient stays, $26 for ED visits, $3,527 for pharmacy, and $1,524 for other services. The large proportion of total spending accounted for by pharmacy expenditures is consistent with the high cost of the drugs commonly used to treat HIV/AIDs. Overall, total expenditures fell in both the second and third quarters before rising back to their quarter 1 values in quarter 4. In contrast, the expenditure components displayed varying trends. For example, "other" expenditures fell each quarter, whereas pharmacy expenditures fell from quarter 1 to quarter 2 and rose in quarter 3 and quarter 4. Medicare and Medicaid cover different services, making it difficult to compare the Medicare expenditures found in Table 3 with the Medicaid expenditures found in Table 7. For example, New York State Medicaid covers prescription drug spending, whereas Medicare (Parts A and B) does not cover prescription drug spending.[8]

Table 7 also provides utilization data for the Medicaid non-dual status participants. The rate of acute hospital admissions was 517 per 1,000 Medicaid beneficiaries per year. The rate of ED visits was 1,314 per 1,000 Medicaid beneficiaries per year, with 15 percent (198 of 1,314) leading to an inpatient stay. Acute hospital admissions and ED visits exhibited no clear trend over time.

[8] Medicare Part D does cover prescription drugs. However, due to a lack of data availability, Part D drug spending was not included in the analysis. Furthermore, many Medicare beneficiaries are not enrolled in Medicare Part D.

Table 7. Baseline year expenditures and health care utilization for Medicaid non-dual status beneficiaries enrolled in the awardee's program through the first program quarter (June 30, 2015)

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	393	375	380	390	393
Average Medicaid expenditures PBPM[b]					
Total payment	5,445 (202)	5,606 (289)	5,339 (252)	5,134 (278)	5,686 (296)
Acute inpatient stays	368 (62)	432 (119)	473 (107)	277 (69)	295 (88)
Total ED payment	26 (3)	28 (4)	28 (5)	23 (4)	25 (4)
ED visits that lead to an inpatient stay	2 (<0.5)	3 (1)	2 (1)	1 (1)	2 (1)
ED visits that do not lead to an inpatient stay	24 (3)	25 (4)	27 (5)	21 (4)	23 (3)
Pharmacy	3,527 (141)	3,528 (216)	3,278 (162)	3,349 (194)	3,926 (263)
Other[c]	1,524 (79)	1,618 (88)	1,560 (87)	1,485 (121)	1,441 (77)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	517 (74)	567 (123)	525 (105)	542 (108)	439 (90)
Total ED visits	1,314 (117)	1,427 (245)	1,446 (245)	1,136 (144)	1,254 (172)
ED visits that lead to an inpatient stay	198 (41)	316 (93)	193 (61)	135 (49)	153 (60)
ED visits that don't lead to an inpatient stay	1,116 (97)	1,111 (158)	1,253 (207)	1,001 (127)	1,101 (139)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as the 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter is 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days that each beneficiary is enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

Table 7 *(continued)*

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third party benefits during the month of program enrollment

[b]Total Medicaid expenditures for the baseline year or a given quarter exclude capitated payments. Expenditures were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include non-office visit practitioner services, dental care, eye care, home health care, laboratory services, intermediate care facility services, nursing home services, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

In Table 8, we find that the total average PBPM Medicaid payment among Medicaid dual status participants during the baseline year was $1,589. The average PBPM Medicaid payments for dually eligible participants were $43 for acute inpatient stays, $4 for ED visits, $240 for pharmacy services, and $1,302 for other services. Common other services received by participants include home health, laboratory, intermediate care facility, and clinic services. Spending on these service types will be broken out separately in future reports. For dually eligible beneficiaries, Medicare is typically the primary payer. Thus, the majority of spending for dual eligibles will be paid for by Medicare. In contrast, for non-dual status Medicaid beneficiaries, Medicaid is typically the primary payer. Thus, Medicaid pays for the majority of the services for non-dual status beneficiaries. As a result, the total dual status Medicaid spending ($1,589) is quite low relative to the total non-dual status Medicaid ($5,445). There is a clear downward trend in total expenditures over time, which is driven partly by the downward trend over time in pharmacy expenditures and partly by the downward trend in "other" expenditures in the last two quarters.

Table 8 also provides utilization data for the Medicaid dually eligible participants. The rate of acute hospital admissions was 434 per 1,000 Medicaid beneficiaries per year. The rate of ED visits was 1,127 per 1,000 Medicaid beneficiaries per year, with 12 percent (139 of 1,127) leading to an inpatient stay. There was no clear trend in service use over the baseline period.

Table 8. Baseline year expenditures and health care utilization for Medicaid dually eligible beneficiaries enrolled in the awardee's program through the first program quarter (June 30, 2015)

Types of expenditures and utilization measures	12 months before enrollment	Expenditures and utilization for each quarter in the 12 months before enrollment			
		Quarter 1 (10 to 12 months before enrollment)	Quarter 2 (7 to 9 months before enrollment)	Quarter 3 (4 to 6 months before enrollment)	Quarter 4 (1 to 3 months before enrollment)
Total number of enrollees[a]	114	106	107	112	114
Average Medicaid expenditures PBPM[b]					
Total Payment	1,589 (203)	1,808 (301)	1,690 (258)	1,537 (200)	1,244 (144)
Acute inpatient stays	43 (23)	32 (11)	34 (12)	51 (14)	50 (14)
Total ED Payment	4 (1)	3 (1)	5 (2)	3 (1)	4 (2)
ED visits that lead to an inpatient stay	0 (<0.5)	0 (<0.5)	0 (<0.5)	0 (<0.5)	0 (<0.5)
ED visits that don't lead to an inpatient stay	4 (1)	3 (1)	5 (2)	2 (1)	4 (2)
Pharmacy	240 (76)	519 (215)	195 (78)	174 (70)	89 (49)
Other[c]	1,302 (167)	1,255 (154)	1,456 (228)	1,310 (181)	1,101 (130)
Health care utilization rates (annualized per 1,000)					
Acute hospital admissions	434 (228)	345 (109)	337 (120)	476 (133)	534 (146)
Total ED visits	1,127 (192)	1,417 (755)	1,496 (358)	805 (216)	819 (195)
ED visits that lead to an inpatient stay	139 (43)	115 (65)	112 (64)	220 (86)	107 (61)
ED visits that don't lead to an inpatient stay	989 (171)	1,302 (749)	1,384 (319)	586 (168)	712 (189)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015.

Notes: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as a 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter is 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and in each baseline quarter according to the number of days that each beneficiary was enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

Table 8 *(continued)*

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third party benefits during the month of program enrollment

[b]Total Medicaid expenditures for the baseline year or for a given quarter excludes capitated payments and were calculated from all claims for each participant with at least one eligible day during that year or quarter.

[c]Other services include non-office visit practitioner services, dental care, eye care, home health care, laboratory services, intermediate care facility services, nursing home services, child care, and clinic services.

ED = emergency department; PBPM = per beneficiary per month

As mentioned, people with HIV/AIDs generally have high rates of mental health and substance abuse problems relative to the general population. In the extreme, mental health/substance abuse problems may lead to an ED visit and/or to a hospital admission. Table 9 presents two measures specific to VillageCare that relate to mental health and substance abuse. The rate of ED visits for mental health or substance abuse is 101 per 1,000 Medicaid beneficiaries per year, whereas the rate of hospital admissions for mental health or substance abuse is 125 per 1,000 Medicaid beneficiaries per year.

Table 9. Measures specific to the awardee for Medicaid beneficiaries enrolled in the program through the first program quarter (June 30, 2015)

		Utilization for each quarter in the 12 months before enrollment			
Health care utilization rates (annualized per 1,000)	12 months before enrollment	Q1 (10 to 12 months before enrollment)	Q2 (7 to 9 months before enrollment)	Q3 (4 to 6 months before enrollment)	Q4 (1 to 3 months before enrollment)
Total number of enrollees[a]	507	481	487	502	507
ED visits for mental health or substance abuse—primary diagnosis[b]	101 (23)	93 (30)	117 (42)	97 (36)	95 (33)
Hospital admissions for mental health or substance abuse—primary diagnosis[b]	125 (30)	119 (40)	117 (46)	154 (56)	111 (37)

Source: Mathematica analysis of information from awardee's finder file and Medicaid claims and enrollment data as of June 30, 2015.

Note: The baseline year is the 365 days before each participant's enrollment date. Each baseline quarter is defined as the 91-day period starting from each beneficiary's enrollment date. For example, the fourth baseline quarter is the 91 days before each beneficiary's enrollment date, the third baseline quarter is the 91 days before the fourth baseline quarter, and so on. The first baseline quarter will be 92 days, thereby summing to 365 days. We weighted every outcome during the baseline year and each baseline quarter according to the number of days each beneficiary is enrolled in Medicaid during the baseline year and in each baseline quarter.

Standard errors are shown in parentheses.

[a]Excludes Medicaid beneficiaries who have state plan enrollment, partial benefits, or third party benefits during the month of program enrollment.

[b]The search for mental health and substance abuse diagnoses is limited to the primary diagnosis on the claim.

ED = emergency department

C. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 10: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 10. Assessment of HCIA-R2 awardee evaluability as of June 1, 2016: Village Center for Care

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	598
Projected Medicaid population with 6 months of program exposure	5,388
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	391
Likelihood of all-cause hospitalizations	2,599
MDE sample size requirement to detect 20% effect	
Total expenditures	98
Likelihood of all-cause hospitalizations	650
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	No serious issues. Proceeding with comparison group selection
Do claims identify the primary expected effects	Some effects observed in claims data but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Services utilized

DDB = difference-in-differences Bayesian

We anticipate conducting a rigorous impact analysis. We will construct a valid comparison group by using propensity score matching to select comparison group members who live in New York City; have HIV/AIDS; and have similar diagnoses, characteristics, and service use as program participants. Our sample should be large enough to detect plausible effects on claims-based measures.

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V. NEXT STEPS

A. Implementation evaluation

As VillageCare enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact evaluation include estimating a propensity score model and performing propensity score matching. The potential comparison group will consist of Medicare and/or Medicaid beneficiaries who have a diagnosis of HIV/AIDs and live either in one of the five boroughs of New York City (Brooklyn, Queens, the Bronx, Manhattan, and Staten Island) or in a surrounding region (Nassau, Suffolk, and Westchester counties). The propensity score model will match on a number of baseline characteristics, including demographic (for example, gender, age, race), health status (for example, risk score), utilization (for example, number of hospital admissions and number of ED visits), and community (for example, median family income of zip code of residence). After selecting a comparison group, we will estimate impacts by using regression models. We will describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include health coaches, program liaisons, and program managers. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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APPENDIX B.37.

WASHINGTON UNIVERSITY SCHOOL OF MEDICINE IN ST. LOUIS

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MATHEMATICA Policy Research

REPORT

APPENDIX B.37

HCIA Round Two Evaluation: Washington University School of Medicine in St. Louis

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Contraceptive Choice Center (C3), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Washington University School of Medicine's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Washington University made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Washington University addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. To what extent do we expect to be able to conduct a rigorous impact analysis of Washington University's program?

[1] The first annual report, released in August 2016, is available at: https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of C3 (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to our evaluability assessment (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Washington University is using HCIA R2 funds to implement C3, which was launched on January 8, 2015 (key program characteristics are shown in Table 1). C3 is modeled after the earlier Contraceptive CHOICE Project, a privately funded research project that provided contraceptive services at no cost to over 9,000 women in the St. Louis, Missouri, area from 2007 to 2011. The CHOICE model promotes the use of long-acting, reversible contraception (LARC), which includes contraceptive implants and intrauterine devices (IUDs). Through its cooperative agreement with CMMI, Washington University is developing and testing the CHOICE model in a real-world setting; Medicaid, Title X, and commercial health insurance plans are the payers.

C3 targets reproductive-age women ages 14 and older in the St. Louis area who are at high risk for unintended pregnancy and childbirth. Center staff obtain women's informed consent to participate in C3 during their first visit, when they may opt out of the research portion of the project and elect to receive clinical services only (per Title X requirements). Women are considered to be enrolled once they complete all paperwork regardless of whether they agreed to participate in the research. They remain enrolled for the duration of the three-year cooperative agreement. Recruitment strategies have included developing community partnerships for referrals and harnessing social media and word-of-mouth referrals from current and former clinic patients. Washington University intends to serve 4,047 direct participants and 2,160 indirect participants in the C3 program.[2] The program's three primary goals are to (1) increase uptake of the most effective contraceptive methods by reducing barriers to access, (2) reduce unintended pregnancy in the target population by 10 percent, and (3) reduce the costs associated with unintended births by 15 percent. C3 program components include the following:

- **Patient navigation:** employing and training a social worker to serve as a federally certified and state licensed insurance navigator who can tell patients what their insurance options are, help them navigate these options, and help them enroll in a plan or program
- **Patient engagement:** using trained, non-clinician health educators to give structured, evidence-based contraceptive counseling to all patients before they receive services and to support those who have concerns after they receive services
- **Direct care provision:** having trained clinicians provide same-day contraceptive services (including same-day insertion of LARCs when possible) that follow evidence-based guidelines

[2] Indirect participants are repeat visitors who do not see the contraceptive counselor or social worker.

Table 1. Washington University: C3 characteristics at a glance

Program characteristic	Description
Purpose	C3 offers contraceptive counseling and family planning services, including same-day insertion of LARCs, to reproductive-age women ages 14 and older in St. Louis.
Components	• **Patient navigation**: employing and training a social worker to serve as a federally certified and state-licensed insurance navigator, who can tell patients what their insurance options are, help them navigate those options, and help them enroll in a plan or program • **Patient engagement**: using trained, non-clinician health educators to give structured, evidence-based contraceptive counseling to all patients before they receive services and to support those who have concerns after they receive services • **Direct care provision**: having trained clinicians provide same-day contraceptive services (including same-day insertion of LARCs when possible) that follow evidence-based guidelines
Target population	Women ages 14 and older in the St. Louis area, with a particular emphasis on women who are at high risk for unintended pregnancy and childbirth
Theory of change/theory of action	C3 is based on the premise that reducing barriers to evidence-based methods of contraception among women of childbearing age and among clinicians who provide family planning services will increase the uptake of methods proven to be most effective, resulting in a reduction in unintended pregnancies and childbirth and their associated costs
Payment model	Bundled or episode payment
Award amount	$4,034,879
Launch date[a]	January 8, 2015
Setting	C3 is housed in the Division of Clinical Research, Washington University Department of Obstetrics and Gynecology
Market area	Urban
Market location	St. Louis, MO, metropolitan area
Outcomes	• Increase in uptake of LARCs to 50% of new contraceptive methods • Increase in contraceptive continuation and satisfaction • Lower rate of unintended pregnancy and childbirth • Cost savings from averted unintended pregnancies and births

[a] After the initial planning period, the awardee's program began to operate as of this date.

LARC = long-acting reversible contraception

With respect to the patient navigation component, and depending on the patients' eligibility, the insurance choices may include Medicaid, the Women's Health Services Program (Missouri's Medicaid family planning waiver), or commercial insurance provided by an employer or purchased through the state's health insurance exchange. In addition, C3's status as a Title X clinic allows it to provide services at reduced cost to those who do not qualify for health insurance under any of these options (including undocumented immigrants) based on a sliding fee scale determined by income. Women who have applied for but are not yet enrolled in Medicaid can also receive same-day services if they pay the sliding fee, and they can be retroactively reimbursed by Medicaid once they are enrolled. In addition, commercially insured women may choose to pay the sliding fee if it is cheaper than what they would be required to pay under their insurance plan. C3's Title X status also means that the program must provide a broad range of services, including well-woman care and testing for sexually transmitted infections, so

women may use the clinic for a variety of health care needs not directly related to C3's mission. Through C3, Washington University is seeking to reduce as many barriers to care as possible by providing extended and weekend hours, transportation vouchers, and language support for non-English speakers.

C3's financial sustainability depends on a diverse mix of payers, including commercial insurers as well as Medicaid or Title X, which cover higher-risk populations. In the second program year, Washington University finalized its plans to pursue a bundled services payment model.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by Washington University during the first year of its cooperative agreement.

- The C3 clinic was fully operational in a newly renovated space. It provided contraceptive counseling and clinical services in a manner consistent with the workflow design the awardee proposed in the HCIA R2 application.
- Washington University was able to implement models that it developed and tested under the earlier CHOICE project for (1) patient education and counseling and (2) same-day contraceptive services.
- C3's social worker became a fully trained and licensed insurance counselor and navigator for the clinic's uninsured patients.
- C3 leaders and staff drew on resources in the greater Washington University community to help them address implementation issues related to marketing, community outreach, billing, and reimbursement.

We also identified several initial implementation challenges and Washington University's strategies for addressing them.

- The public and private insurance environment in Missouri made it necessary for the awardee to rethink its strategies for financial sustainability. The social worker's support for patients who are navigating their health insurance options has proven to be a critical component of C3's design.
- The slower-than-anticipated pace of recruiting and enrolling patients prompted C3 staff and leaders to brainstorm new outreach strategies, dedicate staff to overseeing them, continuously monitor their effectiveness, and consider alternative approaches as warranted.

Finally, we identified several early lessons learned by Washington University in implementing its program.

- A lack of insurance coverage and an inability to pay out-of-pocket costs were major barriers faced by women at high risk for unintended pregnancy as they sought effective contraceptive care in the St. Louis metropolitan area.

- C3 leaders' experience with the fully funded CHOICE project gave them effective clinical models of care but did little to prepare them for the demands of implementing those models in the real world of Medicaid, Title X, and commercial insurance.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Washington University made progress in the following areas:

- The awardee expanded access, improved communication, simplified work processes, and developed the informational infrastructure to support more patients and data reporting, and to handle the complexity of billing and insurance.
- C3 continues to rely on the institutional resources of Washington University to support and strengthen its operations.
- The awardee has secured the initial support of Missouri HealthNet (the state Medicaid agency) to pursue a bundled payment approach and will submit its proposal to Missouri HealthNet for official approval in early fall 2016.

Below we note the key challenges that Washington University has worked to address in the second year of its cooperative agreement.

- Recruitment continues to be the awardee's biggest challenge and highest priority. Key strategies for addressing this challenge in the second program year included launching a community advisory board and conducting in-depth patient interviews to inform marketing strategies, expanding outreach to community organizations to increase referrals of higher-risk patients, and hiring an advertising firm to assist with digital marketing and social media.
- C3 staff found it difficult to implement one key component of the CHOICE model, same-day LARC insertion, because of insurance requirements for prior approval. Staff worked with the Washington University OB/GYN's billing department to identify insurers and pre-certify patients for LARC before their first visit when feasible.
- The political, policy, and insurance environment continues to challenge the implementation of C3. The social worker responds to a range of challenges related to Medicaid applications and enrollment in the family planning waiver program and to insurance approvals for treatment. The awardee also adjusted the clinic staffing model to accommodate a major commercial insurer's requirement that patients be seen by a physician during their first visit.

As Washington University enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- The awardee will need to keep its payers engaged in the third program year if it is to be successful in developing a payment model. In the second program year timely feedback from payers was a concern, and there were delays in obtaining data from Missouri HealthNet for the cost-effectiveness analyses.

- If Washington University can secure buy-in from a Medicaid managed care plan to pilot the bundled payment, it may be able to obtain early results before the cooperative agreement ends. The awardee is also on the path to potentially expand the model statewide if Missouri HealthNet approves its proposal, which will make it easier to sustain the model. The timeline of the approval process, however, is likely to push the expansion to a point beyond the cooperative agreement.

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III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Washington University in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from July 5 through 13, 2016. For the analyses of Washington University's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- The two C3 program co-directors
- Clinic, project, and evaluation managers (three people)
- A social worker who also serves as the insurance navigator
- Two contraceptive counselors (one serving as outreach coordinator as well)
- Qualitative researcher for the program (currently overseeing in-depth participant interviews and analysis)
- One receptionist at the C3 clinic

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[3] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Washington University's implementation progress during the second

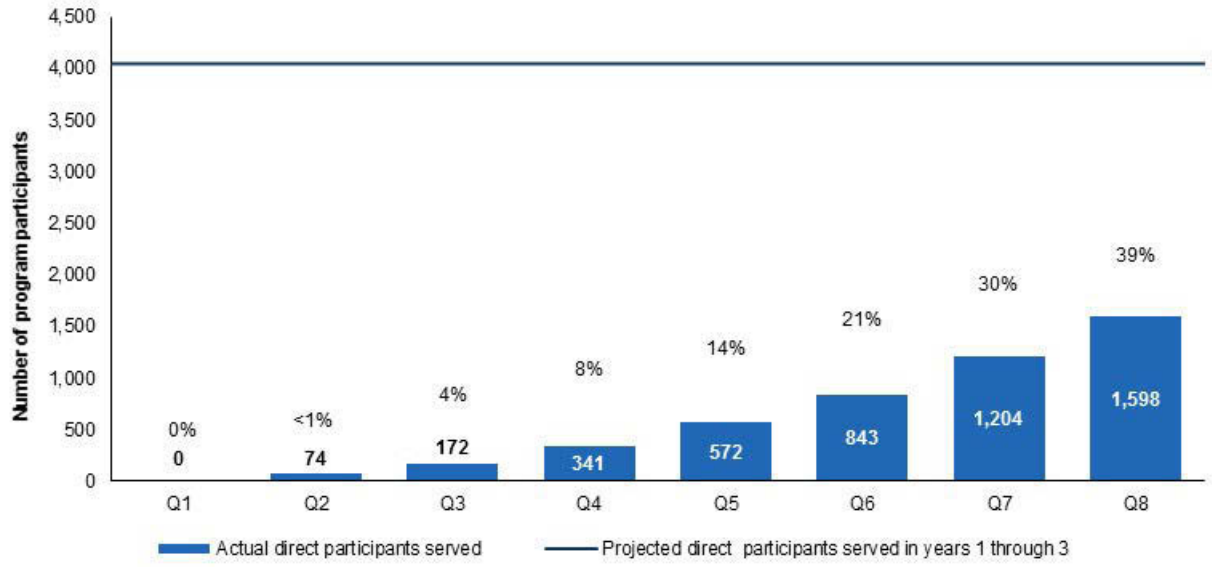
[3] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

A. Program enrollment

Overall, Washington University reported to the implementation and monitoring contractor that it directly served 1,598 participants from January 2015 (the launch of its program) through August 2016, which represents about 39% percent of its 4,047 projected direct participants (Figure 1). Washington University also reported that it indirectly served 752 participants from January 2015 through August 2016, which represents about 35% of its 2,160 projected indirect participants (Figure 2). However, C3 staff have recently revised enrollment targets downward to reflect modified calculations of the sample size needed for the research component of the initiative in light of higher-than-anticipated LARC uptake and the availability of a de-identified comparison group in Medicaid claims. Based on these revised calculations, the awardee now reports being on target to meet its enrollment goals.

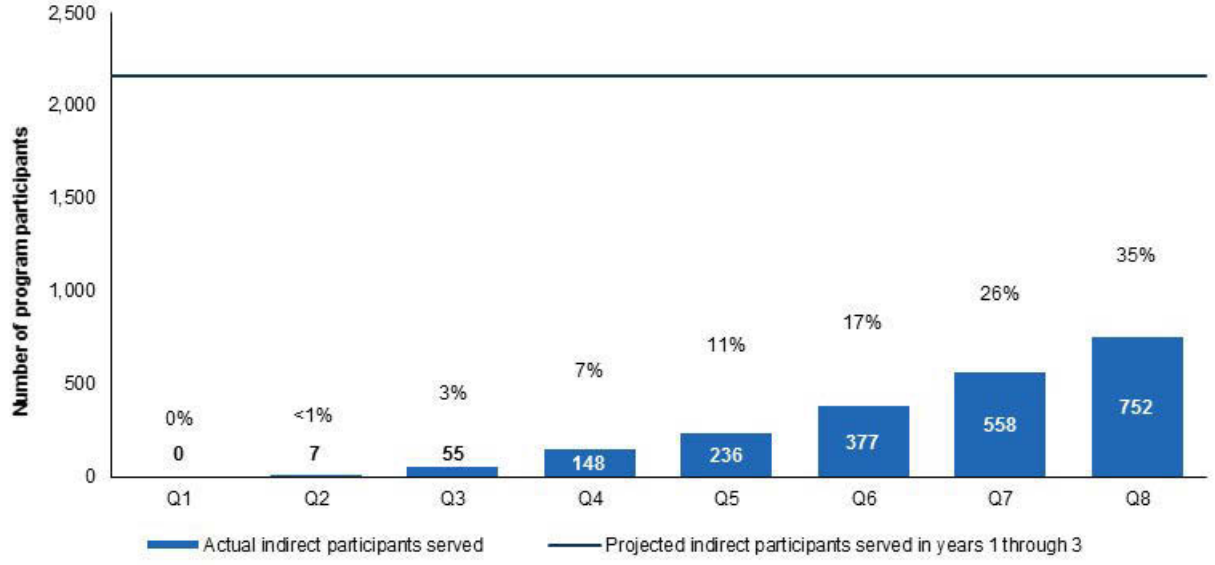
Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. Indirect participants are repeat visitors who do not see the contraceptive counselor or social worker.

Recruitment continues to be Washington University's biggest challenge and priority. As planned, C3 staff are soliciting input from patients and the community to inform outreach and recruitment strategies. Staff have begun to conduct in-depth interviews with C3 patients and have reportedly found the feedback so helpful that they plan to double the number of interviews from 30 to 60. The awardee also convened the first biannual meeting of its community advisory board (a Title X requirement), and going forward, it may consider oversampling patients or creating a separate patient advisory board as the patients' voice was not well-represented in the first meeting.

Interviews with patients and input from the community advisory board have directly informed recruitment efforts. For example, Washington University's public affairs office initially recommended advertising online with Spotify or Pandora, but C3 staff learned from the interviews that its target population is more likely to listen to local radio. The awardee therefore placed four radio ads with three stations over three months, which generated 60 new calls from patients interested in the program. Washington University intends to continue the radio ads, especially on one station that has been the most effective in generating calls. The advisory board members helped to revise the poster for Metro Transit, after the Metro Transit board deemed the original poster too controversial. The community advisory board advised the awardee that C3 should focus more on advertising patient access to care and logistical support (such as extended hours and support for patients who are navigating their insurance options) rather than on specific

clinical services. The board also suggested that the awardee use C3, the acronym, rather than the full name, which highlights contraception. After these changes were made, the Metro Transit board approved the poster. In the end, however, C3 staff reported that advertising with Metro Transit was not effective, so the awardee will not renew its contract with the transit system.

Washington University continues to refine its four-pronged approach to recruitment outlined in the first annual report: (1) outreach to students and staff in the Washington University Medical Center and at the undergraduate campus, (2) community partnerships that target higher-risk populations, (3) digital media outreach, and (4) traditional advertising. Rather than having a separate staff person oversee each area as attempted in the first program year, C3 now has one contraceptive counselor devoted half-time to serving as the coordinator for all outreach.

Within the Washington University medical community, C3 recently partnered with a cardiologist to schedule reproductive health and cardiology appointments on the same day for patients for whom unplanned pregnancy would pose a particularly serious health risk. The awardee is also expanding outreach to other colleges and universities by offering to provide services not available to students and staff at their existing university health services. C3 staff met with health services staff at nearby Southern Illinois University (SIU), for example, where students from Missouri are eligible for in-state tuition. Together, they developed a form intended to facilitate the referral of patients from the St. Louis area who are interested in LARC because the service is not offered at SIU. As these partnerships are just beginning, it is too early to tell how fruitful they will be.

Washington University has also continued to focus on building partnerships with other community organizations in order to increase referrals of patients at higher risk for unintended pregnancy. The awardee began to explore the possibility of partnering with the county jail to serve women pending release, and C3 staff would like to launch a parallel effort with a youth detention center. Staff at the county jail recognize that C3's health care services and insurance assistance are congruent with their pre-release programming designed to help women set goals and start a new chapter in life. C3's bilingual counselor also works with community organizations in the Latina community to reach out to immigrants from Central America, who face numerous barriers to health care because of language, lack of education and misinformation about reproductive health, and lack of insurance. C3 staff also believe that word-of-mouth from friends and family members familiar with C3's services is an increasingly important source of referral, especially among the Hispanic population.

Washington University uses a range of strategies to engage community organizations and clinics. C3 staff have used "secret shopper" strategies to find out about services and pricing at other clinics that might be potential sources of referral. The outreach coordinator also "cold-calls" other organizations that serve women in the St. Louis area to let them know what C3 has to offer and to explore opportunities for partnerships. Some community organizations and clinics (including some federally qualified health centers) are said to be amenable to referring patients to C3 for services that would be prohibitive for their organizations to provide because of cost, training requirements, or religious constraints. C3 staff have also provided basic educational sessions about family planning at community organizations, which help to spread the word about C3 and typically yield a few clinic referrals.

However, partnerships have not always yielded the hoped-for results. Although supportive of C3, community organizations have different missions and priorities, and it can be difficult to incorporate C3 referrals into an established work routine. The C3 staff's initial meetings with jail staff reportedly went well, for example, but the jail staff were less responsive during the summer; in fall 2016, C3 staff hope to resume discussions about a partnership. For nearly half of the second program year, Washington University also deployed a contraceptive counselor to the city's health department once a week to expedite C3 enrollment on site. This effort yielded only three new patients, however, because it was difficult for health department staff to remember to refer patients who would be a good fit. The awardee decided that it would be a better use of limited resources to simply hang C3 posters in all of the department's health centers (which has yielded a few more referrals). For similar reasons, C3 staff stopped recruiting on site at The SPOT youth clinic but has continued to collaborate with the organization to target patients who have aged out of its system. Because youth served by SPOT are often transient, however, the contact information is often incorrect—illustrating yet another problem inherent in reaching communities at risk.

Washington University also continues to use social media and digital marketing strategies to reach out to the community. Instead of using internal staff resources to manage this task, the awardee determined that it would be more efficient to hire a digital advertising firm with the expertise to manage search engine optimization tasks on Google as well as Facebook ads. The C3 evaluation manager tracks and shares internally generated data on how many people request appointments online based on advertisements, and the firm adjusts its strategies accordingly. Through tracking, program staff have learned that more people follow through with making an appointment if they find C3's website from Google searches, whereas people who click on Facebook ads are less likely to schedule an appointment. It is therefore likely that the awardee will prioritize Google efforts in the future. C3's leaders would like to be able to revamp the center's website to generate more active engagement, but they are limited in what they can do by Washington University's branding and visual identity guidelines.

B. Implementation of the service delivery model

In the second program year, C3 staff continued to link many high-risk women to insurance and to contraceptive methods of their choice. The awardee also strengthened C3 operations by improving access, communication, and workflows. Center staff also devoted much of their time to responding to policy and insurance requirements. C3's ability to provide same-day LARC insertion, a core component of the service delivery model, has been challenged by insurers' requirements for prior approval for contraceptive services.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.

- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of the CHOICE model have created advantages and challenges in terms of implementing C3. As noted in the first annual report, Washington University expanded on the original CHOICE model in key respects by offering extensive support for navigating insurance options. This service has taken on even more importance in the second program year, as C3 staff continue to reach out to uninsured women in underserved communities not only to ensure that they have coverage for contraceptive services, but also to meet their broader health care needs. The C3 social worker has found that many patients know little about the health insurance available to them or why they need it if they are young and healthy. They may also not be aware that they have already been enrolled in health insurance in the process of signing up for other social services (such as food stamps). At the C3 clinic, the social worker takes time to educate women about these issues and their options, which may not be the case at other social service agencies that have more clients. Still, some patients decide not to sign up for insurance even when they (and the clinic) could benefit.

C3's contraceptive counselors also appreciate that the model gives them the time and opportunity to educate women, since many women, especially those from some immigrant and underserved communities, lack a basic understanding of reproductive physiology and arrive with serious misconceptions about LARCs. C3 counselors feel they are able to give women the knowledge they need both to make informed decisions on their own behalf and to explain options to friends who, in turn, may come to C3 for their own family-planning needs. As more patients enroll, C3 staff hope to be able to offer the same high level of service.

However, implementing the CHOICE model in a third-party reimbursement environment (rather than as a fully funded research and demonstration project) means that Washington University has had to adjust some of the intervention characteristics accordingly. For example, some payers' requirements (including Medicaid's) for prior approval for contraceptive services raise questions about whether same-day service, a key component of the CHOICE model, is possible. C3 staff are trying to address this issue by gathering information about prospective participants' insurance coverage and their potential interest in various contraceptive methods at their first contact so that they can work with insurers to pre-certify patients before their first clinic visit. The process is time-consuming, but it is a must if the awardee wants to offer same-day LARC insertions. As a result of such efforts, C3's reported rate of same-day contraceptive initiation is still quite high: above 80 percent for all program months. However, this type of service is not possible for all patients, given the uncertainty about their insurance status and contraceptive preferences at their first contact. Indeed, patients' feedback shows that they found the same-day language in C3's marketing messages to be confusing and misleading, prompting C3 staff to decide that they would advertise the availability of same-day appointments, but not same-day contraceptives.

As described in the first program narrative, C3 provides services beyond those specified in the CHOICE model in order to comply with Title X requirements. Moreover, as C3's experience with the Metro Transit board suggests, promoting the clinic in Missouri's conservative social and political environment entails downplaying its focus on contraceptive services and choice. In appealing to community partners to develop the clinic's referral network, C3 staff also emphasize other services of interest, such as follow-up colposcopies for patients who use SIU's health services or for hepatitis testing for women in jail (awaiting Medicaid approval). C3's leaders also recognize that the clinic's financial sustainability depends on women returning to C3 for their routine gynecological care after they receive contraceptive services. For this reason, the program leaders are intentionally promoting C3 as a primary provider of women's health care services.

2. Implementation processes

During the second program year, Washington University focused on expanding access, improving communication, streamlining work processes, and developing the information infrastructure to support more patients and data collection, and to handle the complexity of billing and insurance.

The awardee has continued to adapt C3 processes to meet patients' needs. In addition to offering extended hours two nights a week in the first program year, the clinic introduced bimonthly Saturday hours in the second program year. Extended and weekend hours book up quickly but not too far in advance, so staff believe that they are offering the right level of availability at this point. C3 leaders changed the protocol regarding transportation vouchers and now send out Metro Transit passes before their patients' appointments. Although the use of the passes has not been significant, patients have expressed their appreciation when they hear that this service is offered. In addition, Washington University has made it easier for new patients to find the clinic by improving signage and directions to the parking lot and to the entrance at the rear of the building. Construction has also ended, which allows patients to drive directly into the parking lot from the street. These improvements have also made it easier for transportation services, such as Call-a-Ride, to drop patients off directly at the door.

Results from a survey conducted by C3 leaders to track staff perceptions of teamwork and communication revealed that staff were frustrated with ever-changing procedures. To overcome this frustration, managers stepped up their efforts to improve communication by discussing the changes in group meetings and following up one-on-one with staff to make sure they understand the changes. To improve morale, C3 leaders organized an all-staff retreat, which also provided an opportunity to incorporate staff training to meet Title X diversity and inclusion requirements. Staff reportedly enjoyed the retreat, as it allowed them to reconnect on a personal level. In addition, program leaders circulate positive feedback from patient interviews and surveys to boost team morale.

Washington University continues to develop the infrastructure and support needed to facilitate enrollment and data collection. Contraceptive counselors continue to assist the front desk staff in fielding incoming calls and all staff now have access to an on-line service that allows them to verify the patients' insurance status without having to rely on the front desk. In addition, staff have added prompts to all of C3's patient enrollment and management tools that remind contraceptive counselors to offer appointments with the social worker if patients

indicated that, during the enrollment call, they do not have insurance. (The counselors once needed to remember to complete this step on their own.) This change has increased referrals to the social worker. Similarly, staff updated the follow-up patient surveys conducted over the phone to prompt the contraceptive counselors to ask whether participants who lacked insurance wanted to meet with the social worker. Despite the additional support for the front desk, staff acknowledged that billing and insurance issues continue to demand a lot of time, in part because they are ever changing. The awardee is therefore considering hiring a staff member to help with medical assistant and front desk functions so that an experienced staff member can be designated as the billing/insurance go-to person.

3. Organizational and external context

The political, policy, and insurance environment within which C3 operates continues to have a profound influence on the implementation of the model in the "real world." As described in the first annual report, Missouri elected not to expand Medicaid eligibility to people with an income above the threshold of 19 percent of the federal poverty level. C3 therefore relies heavily on the Medicaid family planning waiver and on Title X funding to pay for services for uninsured and lower-income women; commercial insurance provided through employers or the state's insurance exchange is also a key payment source.

C3 staff noted that the current political climate in Missouri, which is generally hostile to reproductive choice, is creating uncertainty in the Medicaid policy environment. At the time of our interviews, Missouri had just filed public notice of its intent to suspend the federally funded Medicaid family planning waiver demonstration in favor of an entirely state-funded program.[4] All women currently enrolled under the waiver would continue to be enrolled, and eligibility would be extended to women with an income up to 201 percent of the federal poverty level (up from 185 percent). However, no funding would be available for services provided by an organization that also provides abortion services. Although this policy may redirect some patients to C3, staff expressed concern that the underlying political sentiment may not bode well for the program. It is unclear when this policy would take effect.

C3 staff have also found that Medicaid was generally less responsive to its requests in the second program year. At one point, for example, C3 staff were hopeful that Medicaid would help them secure presumptive eligibility for their patients so that the clinic could charge for services while a patient's Medicaid application was pending, rather than being reimbursed retroactively. Because Medicaid applications can take months to approve, presumptive eligibility would help to limit the patients' short-term out-of-pocket expenses and improve the clinic's cash flow. The staff doubt that Medicaid will move forward with presumptive eligibility now, however, given the legislative spotlight on state-funded reproductive health services. On a more positive note, the C3 social worker found Medicaid staff to be responsive, at least initially, to her idea of offering hepatitis screenings for people covered by the family planning waiver—a service that Washington University would like to provide to recently incarcerated women as part of its

[4] Public Notice of Suspension of Federal Expenditure Authority for Section 1115 family planning demonstration, entitled "Missouri Woman's Health Services Program," (project number 11-W-00236/6-7). Accessed September 21, 2016, at http://dss.mo.gov/mhd/waivers/1115-demonstration-waivers/files/missouri-women-health-services-waiver-suspension-notice-phase-out-plan.pdf.

hoped-for partnership with the city jail. The awardee is waiting to hear if the agency will approve this request.

In the meantime, Medicaid and the Medicaid family planning waiver continue to be critical sources of funding for C3's target population, and program staff devote much of their energy to responding to a range of Medicaid-related challenges. For example, after submitting patients' applications for Medicaid, the C3 social worker may find, weeks later, that the application was rejected because of system errors. Investigating the reason for rejection and resolving the issue can take up to two or three months. In addition, applications may be quickly dismissed if the reviewer does not notice that an application was specifically for the family planning waiver, as the applicant would otherwise be ineligible for Medicaid. The C3 social worker mentioned this challenge to the Missouri Family Health Council, which is advocating for a separate application form for the waiver program.

> "I was on a call with other Title X agencies in the state, and I said, 'We pre-cert every single person before they come in.' Everyone was, like, 'Oh my gosh! No one does that. That is so much work!'"
>
> *— Program staff*

C3 staff serve as champions for their patients, helping them to overcome these and other barriers. Although Medicaid started to enforce pre-certification as a cost-saving measure, this challenges the C3 staff's ability to provide same-day contraceptive services. Because Medicaid does not capture information on patients who stop using contraceptives, for example, a request for non-oral contraceptives may be denied because it appears in the system that the patient's contraceptive needs have been met. In these cases, C3 staff cannot obtain pre-certification for LARCs, so they must call the patient to learn why the previous method was discontinued and then talk directly with Medicaid to explain the patient's situation in order to over-ride the denial of service, which takes time. C3 staff emphasized that other clinics do not go to these lengths to meet their patients' needs.

Policies and requirements associated with Title X funding also influence C3 implementation. For example, although Title X does not require C3 to serve men, the Missouri Family Health Council (the state Title X grantee organization) strongly encourages the clinic to serve everyone. Given the importance of their Title X status, C3 leaders recognize that it would be prudent to comply and are beginning to plan for expanding the clinic's services even though this will divert resources from its core mission. The change will, among other things, require additional training for C3's nurse practitioners, who have not treated men in years, and patient history intake forms will need to be revised.

Commercial insurers' changing requirements have also affected C3's operations. United Healthcare, a major insurer in the St. Louis area and Washington University's sole insurer, instituted a rule during the second program year that requires all new patients to be seen by a physician. Since C3 patients are mostly seen by nurse practitioners, and since physicians serve as consultants for more complicated cases, the clinic needed to rework its scheduling. The program director, who is a physician, made herself more available, another physician continued to offer an afternoon a week, and a new physician joined the team to provide additional coverage. As a result of the physicians' flexibility and commitment, patients can be accommodated fairly quickly (within a few days to a week), but this means that blocks of time must be reserved for United Healthcare patients.

Amid the policy shifts and fluctuations in its external environment, C3 continues to rely on Washington University's institutional resources to support and strengthen its operations. The Department of Obstetrics and Gynecology's billing department has provided extensive support to C3 and has hired staff to meet C3's needs. C3 staff reported that the billing department is now more familiar with C3's payment structure, which is critical to C3's efforts to pre-certify patients for contraceptive services and to help them understand their insurance options. When feasible, C3 staff collect information about prospective patients' insurance and contraceptive preferences and enter the information into the patients' electronic medical records (EMRs) before their first visit. The billing team can then check to find out what the patient's insurance will cover and at what rate. C3 staff then relay the information back to the patient to help her determine, for example, whether paying the Title X sliding scale fee would be the better option. The billing team also works closely with C3 staff to help them understand the nuances of insurance, since hundreds of plans, each with different rules, interact regularly with the Washington University Medical Center. In addition, C3 staff work with the billing department to follow up when patients have questions about bills to adjust diagnosis codes, as warranted, so that services are covered.

C. Development of the payment model

Washington University is finalizing its proposal for a bundled payment model to submit to Missouri HealthNet in early fall 2016, having received strong support from the director of Missouri HealthNet to pursue this approach at the end of the second program year. The awardee had originally proposed a bundled payment model in its HCIA R2 application but considered other models after concluding that a bundled payment would not be feasible given the transient nature of the patient population. However, discussions with the implementation and monitoring contractor helped Washington University realize it could develop a bundled payment for a single episode of care (90 days) rather than for a 12-month period. The awardee plans to propose two bundles to Missouri HealthNet: one for LARC provision and one for shorter-acting contraceptive methods. The cost of the contraceptive method would be carved out of the bundles. Both models would cover the initiation of the method (including contraceptive counseling), short-term follow-up to support continuation of the method, and facility and administration charges (including support from the social worker for patients who are trying to navigate their insurance options). A new billing code would need to be created for the contraceptive counseling, which is provided by non-clinical staff.

By working with Missouri HealthNet, Washington University has a potential opportunity to scale up the model to other health centers. If Missouri HealthNet approves the model, the bundle would be available to all family planning providers who serve patients under traditional Medicaid or under the family planning waiver. Missouri HealthNet would give Medicaid managed care plans until the next contract cycle to implement the new reimbursement model. As Missouri HealthNet estimates that it could take up to 18 months to approve and implement the model, Washington University plans to submit its payment model proposal to two Medicaid managed care plans in the interim. The awardee hopes that at least one of the plans will be interested in piloting the model while Missouri HealthNet reviews it. If this works out, the awardee could test the payment model before the cooperative agreement concludes.

> "There are a lot of reproductive justice concerns about linking payment to metrics, particularly if that metric is IUD and implant-use. Because there are concerns that that could lead healthcare providers to engage in coercive practices in order to receive payment incentives. I think we have to be really sensitive to that, because there's a lot of discussion happening around that issue in the family planning community right now."
>
> *— Program director*

At one point, two of the three Medicaid managed care plans were interested in developing innovative payment models, but each plan preferred a different model: value-based purchasing and enhanced fee-for-service (FFS). Each model presents its own challenges. Value-based payment, a model that the awardee gravitated toward in the first program year, is rather controversial when tied to contraceptive services because of concern about incentives leading to coercive practices. C3 leaders felt that enhanced FFS was not innovative enough because it only slightly adjusted current reimbursement practices. The awardee is therefore hopeful that both payers will be willing to shift their support to a bundled payment model after reviewing the documentation prepared by C3 staff for Missouri HealthNet.

Although C3 has recently gained momentum in terms of engaging stakeholders, Washington University struggled throughout the second program year to get timely feedback from payers. The awardee hopes that a final proposal will make payers more responsive. The awardee has also struggled to obtain claims data from Missouri HealthNet to develop a cost-effectiveness analysis. C3 staff have requested that the data set include certain codes and a de-identified control group; they are awaiting approval. Washington University plans to compare the costs of C3 participants (Medicaid and waiver) with the costs of nonparticipants over 18 months.

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IV. UPDATED ASSESSMENT OF PROGRAM EVALUABILITY

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 2: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 2. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Washington University

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	0
Projected Medicaid population with 6 months of program exposure	1,097
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	4,582
Likelihood of all-cause hospitalizations	2,932
MDE sample size requirement to detect 20% effect	
Total expenditures	1,146
Likelihood of all-cause hospitalizations	733
Participation/Selection bias of concern	Yes, patient self-selection high or high refusal rate
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA R2 award
Claims sufficient to identify intervention and comparable comparison group?	No, low rate of identification of treatment group with claims data with significant dilution of treatment effect within an intent-to-treat framework
Likelihood of solid comparison group	Too early to determine due to delay in Medicaid data
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Lack of strong comparison group
Survey data for treatment group that will be analyzed	Staff, clinician, and beneficiary surveys
Implementation data that will be analyzed	We are working with the awardee to obtain its data on LARC use, unintended pregnancies, and unintended births.

At this point, we do not anticipate being able to conduct a rigorous impact analysis for the awardee primarily because of significant challenges to constructing a strong comparison group. In particular, for any pre-period analysis we cannot identify the members of the treatment and potential comparison groups who were or were not in the Contraceptive CHOICE project—which provided services until 2013 and on which the current contraceptive program was modeled. We are concerned that the CHOICE program likely contaminates the pool of participants and the baseline outcomes in Missouri. In addition, there are no comparable data sources on key outcomes used for the comparison group or the pre-period treatment group, relative to the treatment group in the post-period. We are also concerned that the women who have Medicaid insurance may not have had it in the pre-period, given that the program partly focuses on moving uninsured women onto Medicaid insurance—which makes it difficult to track individuals over time in claims data and to isolate the impact of C3 alone. Consequently, for this evaluation, we propose to carry out aggregate comparisons in key outcomes over time between program participants, women in Missouri and Illinois more broadly, and those in other geographic regions. This analysis will be done by using nationally available survey data. Further, using awardee-provided data, we will report on LARC use, unintended pregnancies, and unintended births among treatment group beneficiaries. We will also report on the experiences of awardee staff, clinicians, and participants, based on our surveys.

V. NEXT STEPS

A. Implementation evaluation

As Washington University enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next step in our quantitative analysis includes exploring the usability of data from three national surveys to produce unadjusted and adjusted descriptive statistics of changes in outcomes over time for women in Missouri, Illinois, and other states more broadly. We will also examine the usability of awardee-provided data to analyze the outcomes of women enrolled in C3 specifically.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on staff member's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, contraceptive counselors, the social worker, clinical support staff and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff affiliated with the program.** Eligible clinicians include physicians and nurse practitioners. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument. The survey is scheduled to be launched in May 2017.

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APPENDIX B.38.

WISCONSIN DEPARTMENT OF HEALTH SERVICES

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REPORT

APPENDIX B.38

HCIA Round Two Evaluation: Wisconsin Department of Health Services

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Special Needs Program for Children with Medical Complexity (SNP), the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on the Wisconsin Department of Health Services' progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicaid claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has the Wisconsin Department of Health Services made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How have the Wisconsin Department of Health Services and its implementation partners addressed the issues identified during the first program year? What factors have influenced the ability of the awardee and its implementation partners to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of the Wisconsin Department of Health Services' Medicaid beneficiaries enrolled in the SNP, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the SNP (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to, and any findings from, our analysis of Medicaid claims (Section IV)
- Next steps in our implementation and impact evaluations, including the staff, clinician, and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

The Wisconsin Department of Health Services and its partners, the Children's Hospital of Wisconsin (CHW) and the University of Wisconsin Health–American Family Children's Hospital (AFCH), are implementing the SNP.[2] The SNP provides direct and consultative patient care, care management, and care coordination to medically complex children with high tertiary center use. In 2002, CHW initiated the SNP as a tertiary care–primary care partnership model for children with medical complexity (CMC) and fragility who had high tertiary center use.[3] AFCH launched a similar program in March 2014, but aligned with the SNP at the start of the cooperative agreement. The awardee reported that approximately 80 percent of children in these programs are enrolled in some form of Medicaid, which motivated the Wisconsin Department of Health Services to partner with the programs. Beginning on September 1, 2014, HCIA R2 funding allowed the Wisconsin Department of Health Services to enhance the existing SNP at CHW in Milwaukee, Wisconsin, and begin the enhanced SNP at AFCH in Madison, Wisconsin.

The enhanced SNP serves children with medical complexity and fragility, who are referred to the program by specialists, primary care providers, community programs, and children's caregivers or who are recruited by program staff from neonatal intensive care units (NICUs) and pediatric intensive care units (PICUs). The program defines CMC as those children who have chronic conditions involving three or more organ systems that require ongoing care from three or more specialists. Medical fragility is defined on the basis of prior utilization in two separate program models. Eligibility criteria for the first model, the "intensive" model, are intended to identify patients with very high tertiary center use, including those who experienced (1) two or more hospitalizations totaling 10 or more hospital days, or (2) 20 or more outpatient clinic visits within a 12-month period. Eligibility criteria for the second model, the "ambulatory" model, target children with moderately high tertiary center use and include patients who experienced (1) at least one hospitalization of 5 or more hospital days, or (2) 10 or more outpatient clinic visits within a 12-month period. At both hospitals, SNP physicians are involved in the decision to enroll children who meet the program's eligibility criteria, in order to ascertain that the program can appropriately address the needs of the children. The Wisconsin Department of Health Services and its partners plan to enroll 1,470 participants in the SNP during the three-year cooperative agreement.

The SNP includes three primary components:

1. **Direct care provision.** SNP physicians and nurse practitioners (NPs) provide direct patient care during scheduled clinic visits with participants (semiannual at minimum), consult in the inpatient setting, and support the development and implementation of patient care plans. They also provide care on an as-needed basis when participants have medical events that can be managed with an urgent clinic visit.

[2] In this report, we refer to the program at both CHW and AFCH as the SNP, although AFCH refers to the program as the Pediatric Complex Care Program.

[3] Gordon, John B., Holly H. Colby, Tera Bartelt, Debra Jablonski, Mary L. Krauthoefer, and Peter Havens. "A Tertiary Care–Primary Care Partnership Model for Medically Complex and Fragile Children and Youth with Special Health Care Needs." *Archives of Pediatrics and Adolescent Medicine*, vol. 161, no. 10, October 2007, pp. 937–944.

2. **Care management.** SNP physicians and NPs work with primary care providers and specialty providers to comanage participants. This includes collaborating on medical decision making with other physicians and participants' families and providing 24-7 accessibility to participants' families and other physicians, especially during acute changes in medical conditions and transitions of care between hospital units or from hospital to home.
3. **Care coordination (transitional and outpatient).** Care coordination for participants is primarily performed by registered nurse care coordinators, care coordination assistants (CCAs), and social workers. This team makes post-discharge follow-up phone calls, ensures that SNP and specialty follow-up appointments occur in a timely manner, and frequently functions as the primary point of contact for patients' families. Social workers address psychosocial, emotional, and socioeconomic issues that affect access and adherence to care—for example, by helping to resolve insurance issues, educating families about government programs, and addressing transportation barriers to care.

With HCIA R2 funding, the awardee added new elements to the SNP that were not part of the original program implemented at CHW, including (1) expanded program eligibility criteria, (2) three tiers of program intensity, and (3) a new CCA staff role. The awardee team expanded program eligibility by (1) broadening the criteria for medical complexity and (2) adding the "ambulatory" model for CMC with moderately high tertiary center use. The original program implemented at CHW defined CMC as having conditions involving three or more organ systems that required the care of five or more specialists.[4] Criteria for the current program require the same minimum number of affected organ systems but involvement from only three specialists. Further, the ambulatory model added a new group of CMC with lower levels of prior utilization. The enhanced SNP also includes three tiers of intensity, with the idea that, over time, participants and their families acquire the knowledge and skills needed to care for participants' conditions and coordinate their children's care across providers and settings and require fewer supports. All participants start in Tier 1, in which the services provided are more intense and frequent. As the need for services lessens, staff planned to move participants to Tiers 2 and 3, in which the intensity of services and frequency of contact with the program gradually tapers. Finally, the awardee team established the CCA role to expand nurses' capacity and help the care team maintain contact with participants' families.

The Wisconsin Department of Health Services and its partners hypothesize that enhanced care management and care coordination for the SNP population will lead to the following outcomes: (1) reduced rates of preventable hospitalizations and emergency department (ED) visits, as well as shorter hospital stays; (2) enhanced access to necessary outpatient services; and (3) lower costs. The awardee and its partners also expect to improve family and primary care provider satisfaction by shifting the burden of care coordination to the SNP program staff. By adding the ambulatory model, the Wisconsin Department of Health Services and its partners intend to identify participants before they have a preventable medical event, to either prevent such events altogether or to lessen their negative effects.

[4] Gordon et al. (2007).

Beyond the cooperative agreement, the Wisconsin Department of Health Services plans to fund the program through an actuarially sound per beneficiary per month (PBPM) model, once there is sufficient data to build the model and evidence of program effectiveness. In the interim, the awardee is establishing a temporary fee-for-service (FFS) payment model for care coordination services. As part of its broader sustainability plan, the Wisconsin Department of Health Services plans to submit a State Plan Amendment (SPA) to CMS to implement the SNP as a Section 2703 health home.

A. Summary of findings from the first annual report

In the program narrative in our first annual report, we identified several successes achieved by the Wisconsin Department of Health Services during the first year of its cooperative agreement.

- Both hospitals had operational intensive and ambulatory models, even though AFCH originally only planned to implement the intensive model.
- Efforts to build awareness among pediatric primary care practices, specialty providers, and community organizations led to a steady stream of referrals to the program at AFCH, where the program was newly implemented.
- Building on past collaborations among the three institutions, the awardee team met biweekly to discuss implementation progress, convened workgroups to address barriers to implementation, and shared implementation strategies between the hospitals.
- The Wisconsin Department of Health Services made progress on the payment model by successfully encouraging hospitals to systematically collect data on the time spent with participants by type of staff, model, and tier.

We also identified several challenges in implementing the SNP and the strategies used to address these challenges.

- Going into the cooperative agreement, program staff believed that children who were enrolled in the ambulatory model would have less intense needs than children in the intensive model and that the ambulatory model could therefore support more participants with fewer program staff. In implementation, children in both models had similar levels of need, which required revisions to the nurse-to-participant ratio for the ambulatory model and to the enrollment targets.
- Adding staff at all levels was a considerable challenge, in part due to the uniqueness of the skill mix and the personal characteristics required for the program. To address this challenge, both hospitals continued to seek candidates throughout the year and shifted staff to fill gaps.
- The Wisconsin Department of Health Services revised its enrollment target down from 2,040 participants to 1,800 participants because of the challenges in managing the complexity of the participants' conditions and adding staff.

- The complexity and vulnerability of the SNP patient population created challenges with matching participants to the right model of care and intensity of services. However, hospitals continued to find ways to meet the participants' needs and refine the program accordingly.
- Due to institutional barriers, neither hospital was able to adapt its electronic medical records (EMRs) for the purposes of the program and instead had to develop alternative solutions to collect data to monitor the program.

Finally, we identified several lessons learned by the Wisconsin Department of Health Services and its partners in implementing the program.

- The SNP patient population is highly variable, which creates challenges for matching children to the appropriate model and level of intensity for support. As members of the team gain experience with the program, they are working to identify patients who would benefit most from the SNP and from the appropriate model and level of services.
- Staff for the SNP need to have a unique combination of skills and attitude that may not be typical to other pediatric or hospital positions.
- Although the awardee team is committed to close alignment in the implementation of the SNP at the two hospitals, implementation varied due to characteristics of the care team and hospital systems.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, the Wisconsin Department of Health Services and its partners made several changes to the program.

- The awardee further revised its enrollment targets downward, in large part due to challenges with adding staff quickly enough to meet increasing patient caseloads. This change was also due to the need to revise staff-to-participant ratios for the ambulatory model. The ratios were originally based on the underlying assumption that ambulatory model participants would need less intense services and therefore require fewer care coordination staff.
- After learning that participants in the ambulatory model had as intense needs as participants in the intensive model, the awardee team decided to manage and staff the intensive and ambulatory models in an identical fashion. The awardee team still enrolls children in either model but has dissolved the differences between the interventions offered by those models.
- The Wisconsin Department of Health Services revised its payment model, moving away from capitated payment for care coordination services to FFS payment for these services in the near term, because of the limitations of the time-tracking data collected to inform the capitation rate.
- Both hospitals expanded the amount of time that social workers dedicated to the SNP and expanded the focus of the program on addressing socioeconomic barriers to care.

Below we describe several key challenges that the awardee team has sought to address in the second year of its cooperative agreement, including factors that have affected its ability to fully resolve these challenges.

- Adding program staff at all levels—physicians, NPs, nurses, and CCAs—was a continued challenge, primarily due to a shortage of applicants and difficulties finding candidates with the desired mix of skills. Challenges also stemmed in part from staff turnover, institutional barriers at AFCH to recruiting for the CCA position, and the potential unfamiliarity of the CCA position in the field. Despite these challenges, both hospitals had almost met their Year 2 staffing goals by the end of the second year of the cooperative agreement.
- Due to challenges in expanding program capacity, enrollment did not keep pace with Year 2 expectations. Although the programs receive a steady flow of referrals, the awardee team's primary challenge was ensuring that staffing levels were adequate to provide high quality services to new participants.

As the Wisconsin Department of Health Services moves into its final year of its cooperative agreement, it anticipates the following activities:

- The Wisconsin Department of Health Services plans to submit an SPA to implement a Section 2703 Medicaid health home program to sustain the SNP for at least two years following the cooperative agreement. To support its application, the Wisconsin Department of Health Services anticipates working closely with the hospitals in the coming year to define the program's essential health care services to reposition the program as a medical home.
- The awardee plans for the hospitals to develop a peer network of SNP families and children, a component of the program that was delayed due to implementation challenges such as staffing.
- The Wisconsin Department of Health Services will encourage the hospitals to increase their programmatic focus on managing the social factors that affect access to health care and health outcomes and to start systematically collecting measures to monitor how successfully hospitals address these factors.

Table 1. Wisconsin Department of Health Services: SNP characteristics at a glance

Program characteristic	Description
Purpose	The Wisconsin Department of Health Services (WI DHS) intends for the SNP to improve patient care, reduce unnecessary health care utilization, and improve participants and their families' quality of life.
Components	• Direct care provision • Care management • Care coordination (inpatient transitional and outpatient)
Target population	Children with medical complexity (CMC) and fragility
Theory of change/theory of action	WI DHS and its partners hypothesize that enhanced care management and care coordination for CMC will lead to the following outcomes: (1) reduced rates of preventable hospitalizations and ED visits as well as shorter hospital stays; (2) enhanced access to necessary outpatient services; and (3) lower costs. WI DHS also expects to improve family and primary care provider satisfaction by shifting the burden of care coordination to the SNP.
Payment model	New FFS payment
Award amount	$9,444,864
Launch date[a]	September 1, 2014
Setting	State Medicaid agency; two tertiary, acute care children's hospitals (CHW and AFCH)
Market area	CHW and AFCH are located in metropolitan areas (Milwaukee and Madison, WI, respectively). CHW serves patients from across WI, the Upper Peninsula of MI, and Northern IL. AFCH serves patients throughout WI and from MN, IL, and IA.
Market location	Although both hospitals are located in cities, they treat patients from across the state and coordinate care with providers located near participants' homes.
Core outcomes	• Improve participants' quality of life • Improve primary care provider satisfaction • Improve patient and family satisfaction • Reduce ED visits • Reduce hospitalizations • Decrease total hospital days • Increase rates of outpatient follow-up after hospitalization, at 7 days and 30 days post-discharge • Decrease total cost of care as measured by the PBPM index

[a]The awardee's program became operational as of this date.

AFCH = American Family Children's Hospital; CHW = Children's Hospital of Wisconsin; CMC = children with medical complexity; ED = emergency department; FFS = fee-for-service; PBPM = per beneficiary per month

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by the Wisconsin Department of Health Services in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 24 through July 1, 2016. For the analyses of the Wisconsin Department of Health Services' self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- The Wisconsin Department of Health Services' program leaders and managers
- Hospital program leaders
- Hospital program staff

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[5] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each component includes an update on the Wisconsin Department of Health Services' implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

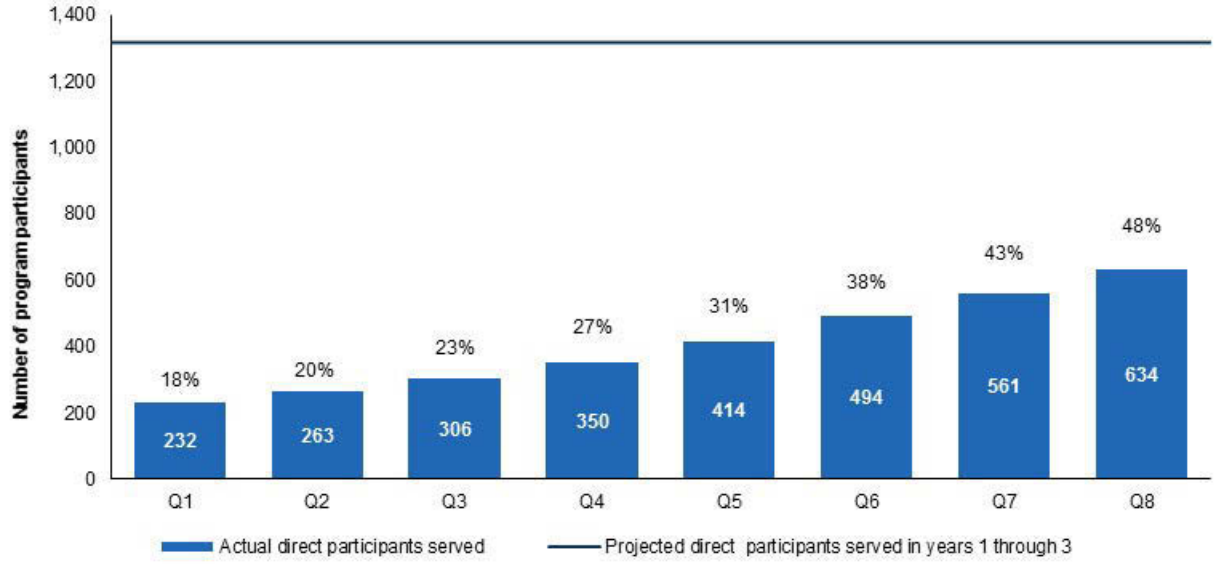
A. Program enrollment

Overall, the Wisconsin Department of Health Services reported to the implementation and monitoring contractor that it directly served 634 participants from September 2014 (the launch of

[5] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

its program) through August 2016, which represents about 48 percent of its 1,317 projected direct participants (Figure 1). The Wisconsin Department of Health Services also reported that it indirectly served 97 participants from September 2014 through August 2016, which represents about 38 percent of its 256 projected indirect participants (Figure 2).[6]

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016

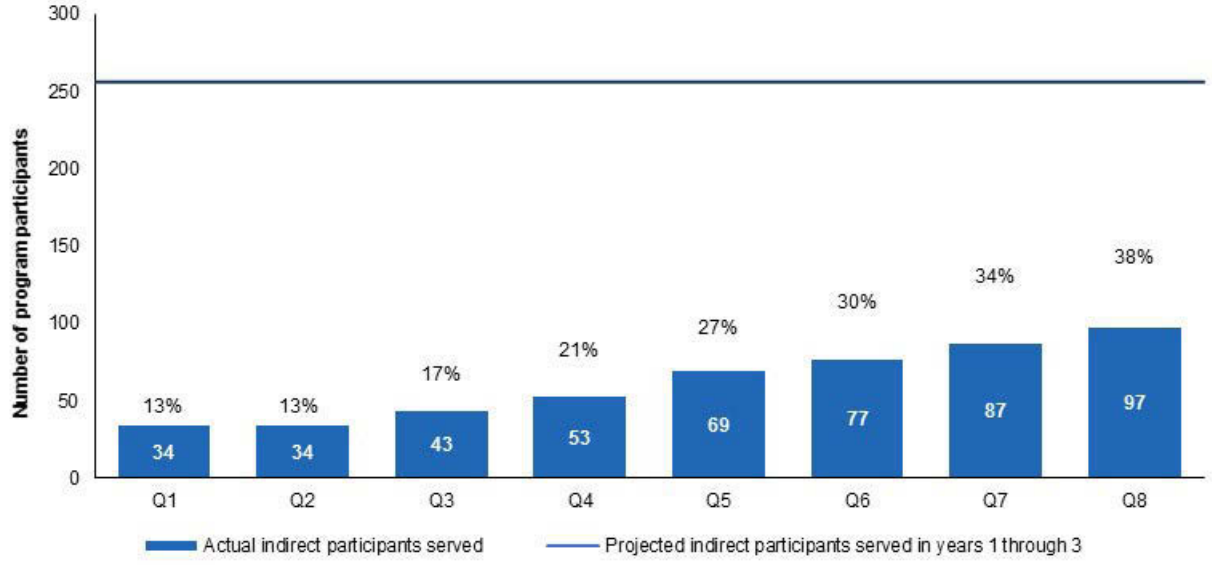


Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. During the virtual site visits conducted in June 2016, WI DHS indicated that it revised its three-year enrollment target downward to 1,470 participants from 1,573 total participants, including both direct and indirect participants. This figure reflects the prior enrollment target of 1,317 direct participants served.

[6] The Wisconsin Department of Health Services covers the costs of program participation for Wisconsin Medicaid or CHIP beneficiaries through HCIA R2 funding and classifies these participants as direct. The Wisconsin Department of Health Services does not cover program costs for participants who are not Wisconsin Medicaid or CHIP beneficiaries. Instead, CHW and AFCH cover the costs for these participants; because of this arrangement, the Wisconsin Department of Health Services classifies these participants as indirect.

Figure 2. Projected versus actual cumulative indirect participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected indirect participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Indirect program participants refers to the total number of unique participants to whom the awardee has provided services through support to service providers from program launch through the eighth program quarter. During the virtual site visits conducted in June 2016, WI DHS indicated that it revised its three-year enrollment target downward to 1,470 participants from 1,573 total participants, including both direct and indirect participants. This figure reflects the prior enrollment target of 256 indirect participants served.

The Wisconsin Department of Health Services and its implementing partners continued to face challenges in Year 2 with increasing enrollment at the pace initially planned. These challenges included attracting and identifying staff with the desired mix of skills, such as strong communication skills and familiarity with the hospital setting, as well as a need for more staff than anticipated due to the higher-than-expected needs of participants in the ambulatory model. As a result, the awardee revised its three-year enrollment target downward. The original goal of 2,040 participants was revised downward in Year 1 to 1,800 participants; in Year 2, the awardee further revised the target number of program participants downward.[7]

Program staff faced challenges adding staff, managing limited staff resources, and addressing participant needs, particularly among new participants. According to program staff, challenges to enrollment primarily stemmed from staff capacity rather than a lack of referrals. The awardee team added many staff in Year 2 but faced challenges ramping up to the target

[7] During the virtual site visits conducted in June 2016, the awardee indicated that it had revised its three-year enrollment target downward to 1,470 participants from 1,573 participants. The revised target includes the existing SNP participants at both hospitals before the cooperative agreement started.

staffing levels in a timely manner, which affected enrollment. We elaborate on the challenges with recruiting staff in Section III.B.

Further, expanding program capacity took more time than anticipated. Interviewees described how new staff need time to learn the program, shadow their colleagues, and complete the orientation period. Because of the complexity of the patients and the fact that many of the staff have never worked in a similar program, new staff slowly ramped up to full patient caseloads. To address this challenge, CHW added a nurse trainer to help expedite the learning curve for new staff, while AFCH deliberately slowed enrollment of new participants until new staff were fully acclimated. Program leaders and staff described the need to balance program quality against expanding program capacity. One strategy that AFCH used to address this challenge was to make decisions about enrollment in a team environment; in doing so, the team had the chance to raise concerns about increasing participant enrollment.

At both hospitals, getting to know new participants and meeting their immediate needs required more staff time than anticipated. New participants were often involved in a medical event that triggered their enrollment and therefore had high needs to start. Further, program staff dedicate more time to new participants to build the kind of close relationship that is central to the type of support that the SNP offers. To address this challenge, the hospitals limited the number of new staff who were matched with new participants.

Despite continued challenges, the awardee cited a number of factors that have facilitated enrollment, including engaging hospital-based providers, primary care providers, and community organizations, as well as actively communicating with families and providers prior to enrolling participants.

Program staff at both hospitals built relationships with providers within their hospitals. As hospital-based providers such as intensivists became familiar with the SNP, these providers started to trust the program and became a primary source of program referrals, according to staff. At AFCH, where the program was new at the start of the cooperative agreement, program leaders described actively engaging external stakeholders, such as pediatric primary care practices, specialists, and community organizations. Staff credited these efforts with increasing referrals to the program. Another hospital leader noted that talking with families and referring providers prior to enrollment helped to ensure that participants were appropriately matched to the SNP and that families and providers understood the SNP staff expertise and resources available.

B. Implementation of the service delivery model

Over the second year of the program, the Wisconsin Department of Health Services and its partners made several program changes, including (1) removing distinctions between the intensive and ambulatory models in terms of service delivery, (2) reducing the emphasis on the three tiers of service intensity, and (3) increasing the time allotted to social workers for the program. In Year 1, the awardee team learned that ambulatory model participants—now referred to as "moderately high users" at CHW—had needs that were as significant as intensive model participants. Hospital staff observed that ambulatory and intensive model participants have somewhat varied needs, albeit at consistently intense levels. For example, ambulatory model participants have more outpatient appointments and often more needs for social supports, while intensive model participants have greater medical needs. Given these lessons learned, the

awardee team decided to forgo using separate program models as a way to determine the types and intensity of services provided to participants. Instead, the awardee team maintains use of the intensive and ambulatory model criteria for two key reasons: (1) to expand the eligibility criteria and (2) to determine whether patients with different patterns of prior utilization have different trajectories in terms of care needs and outcomes. Further, the awardee team designed the SNP to include three tiers of care management and care coordination, based on participant need. However, hospital staff reported that providing different services to different patients was operationally complicated. In addition, participants' health needs are more dynamic in reality and may fluctuate rather than attenuate in a predictable way. For example, participants may have less intense needs followed by a period of having more intense needs. Therefore, the staff maintained use of the tiers but no longer adjusted their service delivery according to the participant's tier. Finally, there is a considerable need for staff who can address the range of social challenges, such as barriers to transportation, which many participants face. Although the awardee team planned to include social workers from the initial design of the program, both hospitals expanded the time commitment of their social workers in Year 2.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

> "By being present on the inpatient side, we get them out of the hospital sooner and we end up doing less testing than would happen if the patients weren't being seen by somebody who knows them well from the past."
>
> *— Program leader*

Program staff conveyed a strong sense that the SNP has a relative advantage to potential care alternatives for patients. For example, one program leader described that the staffing model in the inpatient setting, with attending physicians dedicated to units, precludes physicians from gaining in-depth knowledge of any one patient, except for those whom are admitted frequently. The SNP, on the other hand, offers a dedicated care team that has familiarity with the hospital setting, expertise pertaining to a range of complex medical conditions, and a philosophical commitment to patient-centeredness. By developing close relationships with participants and their families, the care team leverages its in-depth knowledge of participants, their conditions, and family circumstances to support other providers' medical decision making

and to inform care plans. This type of engagement and support in medical decision making and coordination are key benefits of the SNP, according to program leaders.

2. Implementation processes

The awardee described several factors specific to the awardee team that made implementation of the SNP easier, including a team-oriented culture and commitment to learning and quality improvement. Hospital program teams described a dedication to maintaining team cohesion. One strategy the hospitals used was to explicitly define staff roles and responsibilities for members of the team. Further, the staff at both hospitals appeared to be unified by a general passion for the patient population and a commitment to high quality. Within the broader awardee team, AFCH and CHW cited being "on the same page" from the beginning, which helped them maintain alignment between the programs. The hospitals shared approaches with each other; for example, AFCH visited CHW to see how its CCAs interacted with other program staff in preparation for adding the role locally.

> "As opposed to becoming, say, a neurologist, you become somebody who sees patients with neurologic problems, and this problem, and that problem, and the other. There's no way to become expert in all of them, so not only do you need to develop some knowledge, but you also need to . . . trust other people."
>
> *— Program leader*

Despite successfully adding staff (almost to the planned levels) near the end of Year 2, the awardee team encountered several challenges to staff recruitment that affected program implementation and slowed recruitment. These challenges were primarily due to inadequate numbers of applicants, the unique skill set required by the SNP, staff turnover, institutional barriers, and the novelty of the CCA position. For a number of reasons, the awardee team experienced challenges obtaining enough applicants and finding candidates with an appropriate skill mix for all program positions, including physicians, NPs, nurses, and CCAs. First, program staff have learned that the right candidates for the program need a unique combination of skill, attitude, and disposition, such as strong communication skills, familiarity in the hospital system, and a commitment to teamwork, among other characteristics. Because of the diversity of conditions that the participants may have, the SNP requires medical staff with expertise in a range of conditions and an ability to work closely with other providers. Second, the hospitals experienced some turnover among staff in part because some staff were not the right fit. Because of this, the staff learned of the critical need to thoroughly vet candidates. As a result, both hospitals moved to team-based approaches to interviewing and considering candidates for the program. CHW also used a parent panel to interview candidate physicians so that the candidates understood the family-centered culture of the SNP. The hospitals encountered additional barriers specific to the CCA position. AFCH faced institutional obstacles to posting and allocating funding to the position, partly because the institution was undergoing a major organizational change to merge its two component parts (hospital and medical foundation) into one entity. The awardee team described challenges to attracting candidates due to how new the position was to the field and the relatively low salaries being offered.

3. Organizational and external context

The awardee team cited factors specific to the organizational context that made implementation of the SNP easier, including internal stakeholder engagement and leadership buy-in. Program staff described the importance of building trust within the hospitals among other providers. Staff indicated that it takes time to build credibility with providers external to the SNP. Both hospitals reported that SNP staff had earned some trust and acceptance among other providers, which has increased referrals to the program and helped with implementation of the SNP services. For example, AFCH staff described their efforts to build a close collaboration with the palliative care team to reduce duplication of services and ensure role clarity between the two groups.

In addition to internal stakeholder engagement among providers, program leaders at all three institutions described strong institutional and leadership support for the SNP. Program leaders at the Wisconsin Department of Health Services described a strong commitment to addressing the needs of this patient population and redressing fragmented care that could result in adverse outcomes for the population. Hospital program leaders also described institutional support for the SNP; for example, the hospitals currently cover the costs of participation among non-Wisconsin Medicaid participants. Further, staff indicated that hospital system leaders conveyed long-term commitment to the sustainability of the SNP. However, by the end of Year 2, AFCH reported that hospital leaders were beginning to question the sustainability of the program, given that the rate of payment post-award had not been solidified.

The awardee team also noted several barriers specific to the organizational context that affected implementation, including institutional barriers to adapting the EMRs for program purposes. In Year 1, both hospitals faced institutional barriers to modifying their EMRs for SNP purposes. Some of the SNP elements did not appear to serve a clinical purpose and therefore seemed out of place for the EMR among external stakeholders. The time required to modify the EMR also exceeded the time that SNP staff could wait for an automated tool. To address this challenge, both hospitals pursued alternatives. AFCH, for example, used an entirely separate data collection tool to track several award evaluation measures. At both institutions, collecting and documenting time spent on care coordination activities remained a largely manual activity. Staff at both hospitals struggled to fully resolve the challenges of accurately collecting data on time spent on care coordination to inform the payment model. The awardee team was optimistic that the EMRs could be modified for the SNP in the long-term, but did not have clear plans in place at the end of Year 2 to do so. In addition, AFCH reported ongoing challenges due to lack of adequate space for SNP staff. The solutions identified as of the end of Year 2, such as locating staff off campus, were not ideal for workflow or for patient and family engagement.

The awardee team also noted external factors that affected program implementation, including the relationship with participants' primary care providers and the other programs in the state that serve similar patient populations. The relationship with primary care providers was highly variable. Staff noted that they

> "[Hospital staff] just get on the phone and say, 'Do you want this patient, or do you think our program would be better?' If there is a more specialized program, like oncology or trach-vent, then it would make more sense to send them there."
>
> *— Program leader*

deferred to primary care providers' preferences for involvement in patient care and that they shared documentation and notes with them. Staff at both hospitals noted that coordination was easier with primary care providers who practiced within their hospital systems than with those based in the community. This factor was not clearly a facilitator or barrier to implementation; however, it required flexibility on the part of the SNP staff. For example, staff noted the continued need to resolve how best to involve primary care providers in care planning. Prior to enrollment, the awardee team considers other state, hospital, and community programs that could serve the patient and coordinates with the other programs to identify the most appropriate program for the patient.

C. Development of the payment model

The Wisconsin Department of Health Services modified its original payment model because of the data quality issues. The awardee team originally planned to implement a two-phase model. In the first phase (spanning the first 18 to 24 months after the end of the cooperative agreement), the awardee planned to construct an actuarially sound PBPM payment model for care coordination services. In the second phase, the awardee planned to implement a shared savings model—informed by data accrued during the first phase—in which hospitals could share in program savings but would not bear risk for costs exceeding budgeted costs.

> "[Time spent on care coordination is] not something that's currently captured within their EHR, it's not something that they have standards around how to track. . . . How do you actually track and document some of those care coordination . . . services you're providing so that we can configure that into a billable service?"
>
> *— Program leader*

However, in the summer of 2016, the awardee team identified significant quality issues with the time-tracking data that had been collected to inform the first phase of the payment model. The awardee viewed the time-tracking data as critical to fully understanding the care coordination services that the hospitals provide. The hospitals believed that they underreported time spent on care coordination by 30 percent to 50 percent as a result of the difficulty with tracking the time. Because a PBPM rate carries risks on the hospital side, the awardee decided instead to implement a new FFS payment for care coordination services for Medicaid beneficiaries. In this way, the Wisconsin Department of Health Services hoped to learn more about the extensiveness of the care coordination activities for the SNP population via the FFS billing information.

One of the primary barriers to accurate data collection was the lack of a standardized, automated approach to capturing the time spent on care coordination, in part due to the initial institutional barriers the program staff encountered when they tried to modify their EMRs for SNP purposes in Year 1. Staff needed to record time on a child-by-child basis, but some activities (for example, team huddles where the status of many children may be discussed) do not naturally lend themselves to child-by-child recording. To address these challenges, AFCH hired graduate students to create an application for their providers to use in tracking their time spent on care coordination, but providers encountered challenges fitting the process into their workflows. Meanwhile, staff at both hospitals identified a number of solutions, such as finding ways to record time spent on coordination in real time and setting reminders for the task. The awardee

team planned to pursue adapting the EMRs to facilitate collection of these data for payment purposes, but at the end of Year 2, it was still unclear whether doing so would be feasible.

The Wisconsin Department of Health Services also planned to leverage its convening authority to facilitate the hospitals' engagement of commercial insurers in the SNP and a payment model to support the program. However, plans for doing so were still under development by the end of Year 2. The Wisconsin Department of Health Services indicated that it was committed to the SNP but Medicaid cannot be the sole funder of the program. Because many of the SNP participants are non-Medicaid or have commercial insurance as a primary payer, the awardee believed some commercial payers may have interest in a payment model for the SNP.

Further, as part of its broader sustainability plan, the Wisconsin Department of Health Services planned to submit an SPA to CMS to maintain the SNP as a Section 2703 health home.[8] The awardee would implement the FFS payment model during the two-year SPA period, during which the federal government would finance 90 percent of the costs of health home services and the state would finance the balance. The SPA would enable the awardee to extend the program for at least two more years so that the awardee could accrue enough continuous enrollment data to assess the full impact of the program on patient outcomes and costs and help inform future decision making about the program. This comprehensive examination will incorporate data on utilization of pharmacy, personal care services, primary care, and home health services as well as an analysis of care coordination codes.

The awardee anticipated working closely with its partners in the coming year to prepare the SPA application. The SPA would require the SNP to evolve to a medical home model. In Year 1, the hospitals indicated that the program does not seek to be a patient's medical home. However, in Year 2, the Wisconsin Department of Health Services indicated that there is a need to encourage the hospitals to view themselves as the patients' medical homes, and hospital program staff conveyed openness to considering the possibility of becoming medical homes for certain patient populations. The Wisconsin Department of Health Services described the need to collaborate with the hospitals to define the program's essential health care services for the purposes of the SPA and intended to specify patient eligibility criteria consistent with the current ambulatory model.

In addition to the SPA, the Wisconsin Department of Health Services also was considering the possibility of exploring funding for health information technology adoption, because implementation of the SNP would be enhanced through EMR modifications. Meanwhile, one hospital leader noted that CHW may also seek additional grant funding from other sources to support the SNP.

[8] Section 2703 of the Affordable Care Act, by adding Section 1945 of the Social Security Act, authorized the establishment of Medicaid health homes to coordinate care for beneficiaries with chronic conditions. The Wisconsin Department of Health Services does not plan to include the behavioral health conditions included in Section 2703 health homes, as inclusion of these conditions would alter the SNP considerably. Further, Section 2703 health homes typically include patients with at least one chronic condition or who are at risk for certain chronic conditions, whereas the SNP requires at least three chronic conditions.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICAID ENROLLMENT AND CLAIMS DATA

This section presents our first summary of the treatment group's baseline sociodemographic characteristics and medical conditions. We measured both by using Medicaid eligibility and claims data for the year before the date on which each beneficiary enrolled in the enhanced SNP. Eligible participants (children with medical complexity or fragility) enroll in the enhanced SNP after being referred by physicians, primary care providers, or community programs, or when they are recruited by program staff from PICUs or NICUs. The treatment group assessed for this analysis includes Medicaid beneficiaries concurrently enrolled in the enhanced SNP according to lists from the awardee. Given the timing of Medicaid data receipt, it was not possible to analyze Medicaid expenditures and utilization in time to be included in this report.

A. Baseline characteristics of the treatment group

The awardee began to enroll children in the enhanced SNP on September 1, 2014.[9] As of the end of May 2016, 344 Medicaid beneficiaries had been enrolled in the program since the enhanced SNP launch date. This group makes up an estimated 85 percent of program participants. The awardee defines these participants as direct participants. The remaining 15 percent of program participants enrolled since the enhanced SNP launch date (an estimated 49 children[10]) received enhanced SNP services not funded by the award; the awardee defines these participants as indirect participants, and they are not included in the evaluation.[11] These participants are predominantly privately insured.

In presenting the baseline characteristics, we restrict the treatment group to program participants who were enrolled in Medicaid when their eligibility for awardee-provided services began (that is, their program enrollment date) and who were enrolled in Medicaid for a total of 90 days during the baseline year (the 365 days immediately before the date on which they enrolled). The calendar period covered by the baseline quarters is determined by the enrollment date for each participant and therefore varies by participant. Furthermore, we restricted the analysis to participants enrolled on or after the cooperative agreement's start date (September 1, 2014) through December 31, 2015 (the end of the period for which Medicaid data were available). After we excluded participants who did not meet the above criteria (which includes 15 participants enrolled between September 1, 2014 and December 31, 2015 who did not fully meet the Medicaid eligibility criteria and an additional 126 participants first enrolled in the

[9] The SNP has operated continuously since 2002; with HCIA R2 funding, the awardee has enhanced the existing SNP at CHW and expand the enhanced SNP to a second site at the American Family Children's Hospital (AFCH) in Madison. The enhanced SNP model, launched on September 1, 2014, added to the pre-existing program lay navigators and three levels of coordination intensity. In addition, participants are referred to one of two models of care. Participants who first enrolled in the SNP between its initial launch in 2002 and August 31, 2014 were excluded from this analysis and from the evaluation.

[10] In its quarterly reports to the implementation and monitoring contractor, the awardee reports total program enrollment, which includes participants first enrolled prior to the enhanced SNP launch date; these participants were excluded from the evaluation. Therefore, the number of indirect participants enrolled since the enhanced SNP launch date is an estimate based on information from the awardee regarding the percentage of children enrolled in the program who are direct versus indirect participants.

[11] Indirect participants are not included in the awardee's quarterly finder file.

program after December 31, 2015), a total of 203 Medicaid-eligible program participants (referred to hereafter as "beneficiaries") were included in the analysis of baseline characteristics for this report.

B. Baseline characteristics for the full set of Medicaid beneficiaries

Our analysis of baseline demographic characteristics indicates that the awardee is recruiting a population consisting primarily of infants and very young children, most of whom are receiving SSI benefits and who have complex medical conditions. Half (50 percent) of beneficiaries are age 2 or younger, and an additional 16 percent are age 3 to 5; conversely, just 18 percent are age 11 to 17 (Table 2). Beneficiaries are slightly more likely to be male (54 percent) than female. Unfortunately, the race and ethnicity of nearly two-thirds (62 percent) of beneficiaries is unknown. Among beneficiaries for whom data are available, 63 percent are white, whereas 18 percent are black. It is likely that this reflects the racial distribution of Wisconsin's Medicaid population, where 64 percent are white and 17 percent are black (based on data for whom race data are available in the MAX 2012 files). One-third (32 percent) of beneficiaries reside in the Milwaukee metropolitan area (where CHW is located), and 39 percent reside in other metropolitan areas in the state, including Madison (where the AFCH is located). Just 28 percent reside in rural areas. Seventy-eight percent of beneficiaries receive SSI benefits, which is substantially more than the statewide rate of SSI receipt among child Medicaid beneficiaries of about 5 percent (based on MAX 2012 data). Approximately 7 percent of beneficiaries are in foster care (which is not necessarily mutually exclusive of SSI benefit receipt). A relatively small number (9 percent) of beneficiaries are enrolled in a managed care plan, and the remainder receive care on a FFS basis, likely reflecting the significant health care needs of this population. Finally, for 41 percent of beneficiaries, a third-party insurance plan is their primary payer, as defined by the presence of any third-party liability payment in the Medicaid claims data during the beneficiary's baseline year.

The analysis of claims-based characteristics suggest that the awardee is successfully recruiting beneficiaries who have complex chronic conditions (93 percent of beneficiaries) (Table 2).[12] This is expected, given that the awardee's eligibility criteria for medical complexity is somewhat more restrictive than that used by the pediatric medical complexity algorithm (PMCA).[13] The most common diagnoses among beneficiaries include neurological diagnoses

[12] We identified the conditions by using both diagnoses available in Medicaid claims data for up to three years before program enrollment (if available) and the pediatric medical complexity algorithm.

[13] The PMCA defines complex chronic health conditions as those meeting at least one of the following three criteria: (1) more than one body system is involved, and each must be indicated in more than one claim; (2) one or more conditions are progressive; and (3) one or more conditions are malignant. For comparison, the awardee defines children with medical complexity as children who have chronic conditions involving three or more organ systems that require ongoing care from three or more specialists. The awardee specifies medical fragility criteria for two program models on the basis of prior health service utilization. Eligibility criteria for the "intensive" model are intended to identify patients who use tertiary centers at very high rates, including those who had (1) two or more hospitalizations totaling 10 or more hospital days, or (2) 20 or more outpatient clinic visits within a 12-month period. Eligibility criteria for the "ambulatory" model target children who use tertiary care centers at a moderately high rate and those who had (1) at least one hospitalization of 5 or more hospital days or (2) 10 or more outpatient clinic visits within a 12-month period. The hospitals do not vary the interventions provided to participants based on program model, so the evaluation considers participants in either model to be part of the treatment group.

(present in 63 percent of beneficiaries), gastrointestinal diagnoses (present in 49 percent), pulmonary-respiratory diagnoses (present in 46 percent), cardiac diagnoses (present in 45 percent), and mental health diagnoses (present in 45 percent).[14] We plan to use the PMCA's condition category flags as a starting point to identify beneficiaries with medically complexity for the comparison group. Along with the flags, we will incorporate other criteria, including a claims-based count of the number of specialists beneficiaries are seeing. We expect to be able to identify beneficiaries with medical fragility by using the utilization-based selection criteria defined by the awardee.

Table 2. Baseline year demographic characteristics of Medicaid beneficiaries enrolled in the awardee's program through December 31, 2015

	All enrollees (N = 203)	
	Number	Percentage
Age as of enrollment date		
0–2	102	50.2%
3–5	33	16.3%
6–10	31	15.3%
11–13	16	7.9%
14–17	21	10.3%
Gender		
Female	94	46.3%
Male	109	53.7%
Race/Ethnicity		
White	49	24.1%
Black	14	6.9%
Other	15	7.4%
Unknown	125	61.6%
Geographic area		
Milwaukee metropolitan area	65	32.0%
Other metropolitan areas	80	39.4%
Rural areas	57	28.1%
Medicaid benefit plan(s)[a]		
SSI	158	77.8%
Foster care	14	6.9%
Other	45	22.2%

[14] The presence of each health condition is defined as any diagnosis classified under the condition category by the PMCA being indicated in more than one claim.

Table 2 *(continued)*

	All enrollees (N = 203)	
	Number	Percentage
Managed care enrollment		
Any managed care enrollment	19	9.4%
No managed care enrollment	184	90.6%
Third-party insurance[b]		
Any TPL payment	83	40.9%
No TPL payments	120	59.1%
Medical complexity status[c]		
Non-chronic	8	3.9%
Non-complex chronic	4	2.0%
Complex chronic	189	93.1%
Body system(s) affected[d]		
Cardiac	92	45.3%
Craniofacial	4	2.0%
Dermatological	5	2.5%
Endocrinological	24	11.8%
Gastrointestinal	100	49.3%
Genetic	71	35.0%
Genitourinary	63	31.0%
Hematological	10	4.9%
Immunological	18	8.9%
Mental Health	92	45.3%
Metabolic	20	9.9%
Musculoskeletal	88	43.3%
Neurological	127	62.6%
Pulmonary-Respiratory	94	46.3%
Renal	14	6.9%
Ophthalmological	46	22.7%
Otologic	2	1.0%
Otolaryngological	13	6.4%

Note: The baseline period is defined as one year (365 days) prior to each individual beneficiary's program enrollment date. Medicaid enrollees must have at least 90 days eligibility in the baseline period and on the date of program enrollment date to be included in the eligible sample. All beneficiary characteristics are measured in the last month of the baseline period unless otherwise indicated.

[a]Beneficiaries may be eligible for more than one benefit plan; as a result, percentages may sum to more than 100.

[b]Identified in the beneficiary's one-year baseline period.

[c]Identified by using the Pediatric Medical Complexity Algorithm (PMCA) and in the three years prior to the beneficiary's program start date.

[d]Children may have more than one body system affected; as a result, percentages may sum to more than 100.

C. Baseline characteristics for Medicaid beneficiaries, by program site

About twice as many beneficiaries first enrolled in CHW's program during the analysis time frame compared with those who first enrolled in AFCH's program (135 versus 68, respectively) (Tables 3 and 4). This discrepancy may be related to the fact that there is a higher population concentration in Milwaukee and its surrounding areas compared with that in Madison. On the other hand, the discrepancy may be related to the fact that CHW's program is well-established, having been in place (in a somewhat more limited form) since 2002, whereas AFCH's program is relatively new.[15] At the start of the cooperative agreement in September 2014, CHW received a steady flow of patient referrals, whereas AFCH spent much of the first year of the cooperative agreement building connections with, and raising awareness of the SNP among, primary care providers, specialists, and community programs to foster future referrals.

The baseline beneficiary characteristics differ somewhat from one hospital to the other. Beneficiaries enrolled at CHW are younger, more likely to reside in a metropolitan area, and more likely to receive SSI benefits. They are less likely to have third-party insurance as the primary payer and Medicaid as the secondary payer, compared with those enrolled at AFCH. Specifically, more than half (60 percent) of beneficiaries enrolled at CHW are 2 or younger, but just 31 percent of those enrolled at AFCH are within this age range (Tables 3 and 4). It is likely that this difference reflects the fact that in the enhanced SNP's first year of operations, CHW actively recruited infants from the NICU. AFCH accepted infants from the NICU but did not actively recruit due to a well-established NICU follow-up program. Most beneficiaries enrolled at CHW (81 percent) reside in Milwaukee or in other metropolitan areas, and the remaining 19 percent reside in rural areas. Of those enrolled at AFCH, only about half (51 percent) reside in metropolitan areas, and the other half reside in rural areas. A somewhat higher percentage of beneficiaries enrolled at CHW (85 percent) are SSI recipients, compared with those enrolled at AFCH (63 percent). A lower percentage of beneficiaries enrolled at CHW (36 percent) had third party insurance as the primary payer and Medicaid as the secondary payer, compared with those enrolled at AFCH (50 percent).

Despite these differences, beneficiaries at the two hospital sites were fairly similar at baseline in terms of rates of medical complexity and common diagnoses. Ninety-five percent of beneficiaries at CHW were classified as having complex chronic health conditions, and 90 percent of beneficiaries at AFCH were classified as such (Tables 3 and 4). Four of the top five most prevalent diagnoses were common to beneficiaries enrolled at both program sites. Neurological diagnoses were most common (59 percent of beneficiaries at CHW and 71 percent of beneficiaries at AFCH had a neurological diagnosis according to claims data). At both sites, other diagnoses among the top five included gastrointestinal diagnoses (46 percent of beneficiaries at CHW and 56 percent at AFCH), pulmonary-respiratory diagnoses (46 percent of beneficiaries at CHW and 47 percent at AFCH), and mental health diagnoses (43 percent at CHW and 50 percent at AFCH). Cardiac diagnoses were somewhat more prevalent among beneficiaries at CHW (52 percent versus 32 percent at AFCH), and musculoskeletal diagnoses were more prevalent at AFCH (54 percent versus 38 percent at CHW).

[15] AFCH launched the first iteration of a similar program in March 2014.

Table 3. Baseline year demographic characteristics of Medicaid beneficiaries enrolled in the awardee's program through December 31, 2015, by program site: CHW

	All enrollees (N = 135)	
	Number	Percentage
Age as of enrollment date		
0–2	81	60.0%
3–5	19	14.1%
6–10	15	11.1%
11–17	20	14.8%
Gender		
Female	64	47.4%
Male	71	52.6%
Race/Ethnicity		
White	29	21.5%
Black	11	8.1%
Other	11	8.1%
Unknown	84	62.2%
Geographic area		
Milwaukee metropolitan area	64	47.4%
Other metropolitan areas	46	34.1%
Rural areas	25	18.5%
Medicaid benefit plan(s)[a]		
SSI	115	85.2%
Other	28	20.7%
Managed care enrollment		
Any managed care enrollment	18	13.3%
No managed care enrollment	117	86.7%
Third-party insurance[b]		
Any TPL payment	49	36.3%
No TPL payments	86	63.7%
Medical complexity status[c]		
Non-chronic	5	3.7%
Non-complex chronic	1	0.7%
Complex chronic	128	94.8%

Table 3 *(continued)*

	All enrollees (N = 135)	
	Number	Percentage
Body system(s) affected[d]		
Cardiac	70	51.9%
Craniofacial	2	1.5%
Dermatological	3	2.2%
Endocrinological	13	9.6%
Gastrointestinal	62	45.9%
Genetic	51	37.8%
Genitourinary	28	20.7%
Hematological	8	5.9%
Immunological	14	10.4%
Mental Health	58	43.0%
Metabolic	12	8.9%
Musculoskeletal	51	37.8%
Neurological	79	58.5%
Pulmonary-Respiratory	62	45.9%
Renal	6	4.4%
Ophthalmological	29	21.5%
Otologic	2	1.5%
Otolaryngological	8	5.9%

Note: The baseline period is defined as one year (365 days) prior to each individual beneficiary's program enrollment date. Medicaid enrollees must have at least 90 days eligibility in the baseline period and on the date of program enrollment date to be included in the eligible sample. All beneficiary characteristics are measured in the last month of the baseline period unless otherwise indicated.

[a]Beneficiaries may be eligible for more than one benefit plan; as a result, percentages may sum to more than 100.

[b]Identified in the beneficiary's one-year baseline period.

[c]Identified by using the Pediatric Medical Complexity Algorithm (PMCA) and in the three years prior to the beneficiary's program start date.

[d]Children may have more than one body system affected; as a result, percentages may sum to more than 100.

Table 4. Baseline year demographic characteristics of Medicaid beneficiaries enrolled in the awardee's program through December 31, 2015, by program site: AFCH

	All enrollees (N = 68)	
	Number	Percentage
Age as of enrollment date		
0–2	21	30.9%
3–5	14	20.6%
6–10	16	23.5%
11–17	17	25.0%
Gender		
Female	30	44.1%
Male	38	55.9%
Race/Ethnicity		
White	Not available[a]	Not available
Black	Not available	Not available
Other	Not available	Not available
Unknown	Not available	Not available
Geographic area		
Metropolitan areas	35	51.5%
Rural areas	32	47.1%
Medicaid benefit plan(s)[b]		
SSI	43	63.2%
Other	31	45.6%
Managed care enrollment		
Any managed care enrollment	Not available[a]	Not available
No managed care enrollment	Not available	Not available
Third-party insurance[c]		
Any TPL payment	34	50.0%
No TPL payments	34	50.0%
Medical complexity status[d]		
Non-chronic	3	4.4%
Non-complex chronic	3	4.4%
Complex chronic	61	89.7%

Table 4 *(continued)*

	All enrollees (N = 68)	
	Number	Percentage
Body system(s) affected[e]		
Cardiac	22	32.4%
Craniofacial	2	2.9%
Dermatological	2	2.9%
Endocrinological	11	16.2%
Gastrointestinal	38	55.9%
Genetic	20	29.4%
Genitourinary	35	51.5%
Hematological	2	2.9%
Immunological	4	5.9%
Mental Health	34	50.0%
Metabolic	8	11.8%
Musculoskeletal	37	54.4%
Neurological	48	70.6%
Pulmonary-Respiratory	32	47.1%
Renal	8	11.8%
Ophthalmological	17	25.0%
Otologic	0	0.0%
Otolaryngological	5	7.4%

Note: The baseline period is defined as one year (365 days) prior to each individual beneficiary's program enrollment date. Medicaid enrollees must have at least 90 days eligibility in the baseline period and on the date of program enrollment date to be included in the eligible sample. All beneficiary characteristics are measured in the last month of the baseline period unless otherwise indicated.

[a]Number of beneficiaries in each category is too small to report.

[b]Beneficiaries may be eligible for more than one benefit plan; as a result, percentages may sum to more than 100.

[c]Identified in the beneficiary's one-year baseline period.

[d]Identified by using the Pediatric Medical Complexity Algorithm (PMCA) and in the three years prior to the beneficiary's program start date.

[e]Children may have more than one body system affected; as a result, percentages may sum to more than 100.

D. Identifying a comparison group

To identify a comparison group, we continue to explore methods for replicating the awardee's program eligibility criteria. Although we will we will be limited in our ability to replicate the clinical decision making that influences whether patients are enrolled in the enhanced SNP, we expect to be able to identify children with medical complexity based on the presence of three more condition categories flagged by the PMCA, coupled with information from claims data indicating children seen by three or more specialists. Furthermore, we also expect to be able to replicate the awardee's utilization-based medical fragility criteria by using information in claims data. Given the qualitative finding that many children are referred to the enhanced SNP following a major medical event (though it is not a program eligibility requirement), we will need to further explore how to replicate this characteristic when we select a comparison group.

Based on an analysis of the beneficiaries' zip codes, the enhanced SNP is not drawing Medicaid beneficiaries residing in northwest Wisconsin, which confirms that we may be able to draw a comparison group of beneficiaries from this area. One caveat is that beneficiaries with medical complexity or fragility in this area may travel to Minneapolis, the closest major metropolitan area, for tertiary care. However, the awardee confirmed that the timeliness and completeness of claims data for services received out of state should be comparable to that for in-state services, so we do not anticipate that this will pose a problem for the utilization and expenditures analysis.

E. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 5: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 5. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Wisconsin Department of Health Services

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	Not applicable
Projected Medicaid population with 6 months of program exposure	868
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,649
Likelihood of all-cause hospitalizations	380
MDE sample size requirement to detect 20% effect	
Total expenditures	412
Likelihood of all-cause hospitalizations	95
Participation/Selection bias of concern	Yes, provider clinical judgment/non-claims data used to identify treatment group
Full implementation of new intervention	Questionable, patients may have been receiving intervention prior to HCIA R2 award
Claims sufficient to identify intervention and comparable comparison group?	Yes, high rate of identification of treatment group with claims data within an intent-to-treat framework
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Some effects observed in claims data, but important effects likely missing
Core outcomes estimation method	DDB
Primary reason for no rigorous evaluation	Not applicable
Survey data for treatment group that will be analyzed	Clinician, staff, and beneficiary surveys
Implementation data that will be analyzed	Time spent on care coordination activities

DDB = difference-in-differences Bayesian

We anticipate constructing a valid comparison group comprised of beneficiaries who are similar to treatment group members (that is, who are also medically complex children), but who live far from the two participating hospitals. We can come close to replicating the awardee's eligibility criteria by using claims-based algorithms, though we may have some selection bias issues because providers may have input into enrolling participants. Enrollment will likely be high enough to detect plausible effects for the full sample, although we may not have sufficient sample size to detect effects separately for the two sites.

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V. NEXT STEPS

A. Implementation evaluation

As the Wisconsin Department of Health Services enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis include constructing a viable comparison group composed of beneficiaries with medical complexity or fragility who are not receiving care from either of the two treatment hospitals. Specifically, we will refine our comparison group identification methodology and subsequently analyzing claims for beneficiaries residing in northwest Wisconsin to determine whether there are likely to be enough children in this geographic area who meet the selection criteria to form a sizeable group of potential comparison group beneficiaries. We expect to proceed with comparison group matching in April 2017, when we receive Medicaid claims data for the first half of calendar year 2016. At that point, we anticipate that at least 300 Medicaid beneficiaries will have enrolled in the program. We will then proceed with propensity score matching on key observable baseline characteristics between treatment and potential comparison beneficiaries. After constructing a comparison group, we will estimate impacts and describe our findings in future reports.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include registered nurses, care coordinators, social workers, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of clinician staff in the program.** Eligible clinicians include physicians, dentists, nurse practitioners, and physician assistants. The survey will focus on the clinicians' implementation experience and on their perception of program effects on provider behavior and patient outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in March 2017.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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VI. TECHNICAL APPENDIX

This technical appendix explains how we constructed common baseline sociodemographic characteristics, medical complexity status, and condition categories from Medicaid claims and enrollment data for the enhanced SNP.

Section A describes the input data we received from the awardee. Section B describes how we defined Medicaid enrollment, which is the starting point for a participant's baseline year. This section also describes the criteria we used to determine whether participants were eligible for our analysis. Section C describes how we constructed the demographic characteristics presented in Tables 2 through 4. Section D describes how we measured pediatric medical complexity status and condition categories.

A. Input data

We defined the population for the awardee's program by using the most recent finder file, which included information for all direct program participants enrolled through May 31, 2016. Direct program participants are defined as those concurrently enrolled in the enhanced SNP and Wisconsin Medicaid. The finder file contained program enrollment information (including the date on which participants enrolled and disenrolled (if applicable), the program site at which they were enrolled, the program tier, and some basic sociodemographic information. In addition, the awardee provided a Medicaid eligibility file, a FFS and an encounter claims file, and a header diagnosis file containing data for all children enrolled in Wisconsin Medicaid in calendar years 2012, 2013, 2014, and 2015.

B. Definition of enrollment

For the awardee's program, the enrollment date is defined as the date on which a child enrolled in the enhanced SNP. For the analysis presented in this report, we included program participants who first enrolled in the program between September 1, 2014 (when the cooperative agreement went into effect) and December 31, 2015. This cutoff date was chosen because it aligns with the latest date of Medicaid eligibility and claims data provided by the awardee. An early form of the SNP has been operating since 2002, so a substantial number of children first enrolled before September 1, 2014. These children were excluded from the analysis presented in this report, they are excluded from the evaluation.

The baseline year is the 365 days immediately before each participant's program enrollment date. We included participants in the analysis if they were eligible for Medicaid for at least 90 days during the baseline year and on the date of program enrollment. We refer to this group as the Medicaid-eligible participant sample, or simply, beneficiaries.

C. Sociodemographic characteristics

Tables 2 through 4 show sociodemographic characteristics (overall and within each of the awardee's two program sites) for the Medicaid-eligible participant sample based on Medicaid eligibility and claims data. Age was measured as of the date the beneficiary enrolled in the SNP. Gender and race/ethnicity were also measured based on the value indicated in the Medicaid eligibility file. Geographic area, as of the beneficiary's program enrollment date, was defined by

using the beneficiary's zip code indicated in the Medicaid eligibility file and was then rolled up to a specific geographic area (for instance, the Milwaukee metropolitan area) based on the mapping in the U.S. Census Bureau's Urban Area to ZIP Code Tabulation Area (ZCTA) Relationship File. The beneficiary's Medicaid benefit plan was measured as of the beneficiary's program enrollment date based on the values listed for this monthly variable in the eligibility file. If this variable indicated enrollment in any SSI benefit plan, the beneficiary was included in the SSI category; similarly, if this variable indicated enrollment in the foster care benefit plan, the beneficiary was included in the foster care category. Beneficiaries enrolled in both SSI and foster care plans were listed in both categories. Beneficiaries not enrolled in an SSI or a foster care benefit plan were classified in the "Other" category. We measured managed care enrollment as of the date on which the beneficiary enrolled in the enhanced SNP by using the managed care enrollment variable included in the Medicaid eligibility file; this monthly variable contains a "yes" or "no" value. Third-party insurance was measured according to whether any third-party liability payment was in the claims data during the child's baseline year. If any payment was present, the beneficiary was defined as having third-party insurance.

D. Baseline medical complexity status and condition categories

We constructed the medical complexity status and condition categories shown in Tables 2 through 4 by using Medicaid claims data and PMCA software version 2.0.[16] We first created a claim-level file that retained all diagnoses codes in the Medicaid claims data on claims with a start or end date falling up to three years before the beneficiary's program enrollment date.[17] This file served as the input data set to the PMCA software, which in turn produces a beneficiary-level file flagging each beneficiary's medical complexity status and condition categories. Based on validation work conducted by the developer and on the recommended methodology for using the algorithm on Medicaid administrative data, we used the "more conservative" version of the algorithm. This version requires, for example, that a beneficiary has more than one diagnosis code within a given condition category for that condition category to be flagged (as opposed to only one diagnosis code for the less conservative algorithm version).

[16] Simon, T. D., L. C. Cawthon, J. Popalisky, and R. Mangione-Smith. "Development and Validation of the Pediatric Medical Complexity Algorithm (PMCA) Version 2.0." In press at *Hospital Pediatrics*, December 16, 2016. PMCA version 2.0 software is available at http://www.seattlechildrens.org/research/child-health-behavior-and-development/mangione-smith-lab/measurement-tools/.

[17] PMCA version 2.0 only accommodates ICD-9 codes. As a result, the software will not recognize any claims incurred from October through December 2015. Therefore, these claims are excluded from the analysis (as are any claims incurred before calendar year 2012).

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APPENDIX B.39.

YALE UNIVERSITY

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MATHEMATICA Policy Research

REPORT

APPENDIX B.39

HCIA Round Two Evaluation: Yale University

August, 2017

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I. INTRODUCTION

A. Background and purpose of the HCIA R2 initiative

On September 1, 2014, the Center for Medicare & Medicaid Innovation (CMMI) in the Centers for Medicare & Medicaid Services (CMS) awarded the second round of cooperative agreements, known as Round Two of the Health Care Innovation Awards (HCIA R2). The 39 awardees are using these three-year cooperative agreements to implement their proposed innovative service delivery models and to design and test new payment models for improving health and the quality of care, and for lowering the cost of care for Medicare, Medicaid, and Children's Health Insurance Program (CHIP) beneficiaries. Mathematica Policy Research and its partners, under contract to CMS, are evaluating the extent to which the awardees have been successful in implementing their programs and in making progress toward these goals.

B. Evaluation goals and purpose of this program narrative

The federal evaluation is designed to identify the factors that facilitate or impede the implementation of the new service delivery and payment models (implementation evaluation) and to estimate their effects on costs, utilization, quality, and patient outcomes (impact evaluation). This program narrative, the second in a series of four, updates the narrative in our first annual report in which we described our early understanding of the Paramedic Referrals for Increased Independence and Decreased Disability in the Elderly (PRIDE) program, the awardee's implementation experience during the first program year, and its progress toward its enrollment goal.[1] This year's update focuses on Yale University's progress in implementing its service delivery model during the second program year and in developing its payment model (implementation evaluation). We also focus on the initial findings from our analysis of Medicare claims data (impact evaluation).

Our discussion of these topics addresses the five research questions below:

1. How much progress has Yale University made in implementing its program during the second year?
2. What important changes have occurred during the second program year? What factors have driven these changes?
3. How has Yale University addressed the issues identified during the first program year? What factors have influenced the awardee's ability to address these issues?
4. What are the major successes and challenges that are anticipated in the year ahead?
5. What are the baseline characteristics of Yale's Medicare beneficiaries, and to what extent do we expect to be able to conduct a rigorous impact analysis of the awardee's program?

[1] The first annual report, released in August 2016, is available at https://downloads.cms.gov/files/cmmi/hcia2-yroneevalrpt.pdf.

C. Roadmap to the narrative

The remainder of this narrative presents the following:

- An overview of the PRIDE program (Section II)
- Findings from our implementation evaluation in three areas: (1) enrollment, (2) implementation of the service delivery model, and (3) design and implementation of the payment model (Section III)
- An update to the evaluability assessment and baseline characteristics for the treatment group of Medicare beneficiaries (Section IV)
- Next steps in our implementation and impact evaluations, including the staff and participant surveys (Section V)

II. PROGRAM OVERVIEW AND SUMMARY OF FINDINGS TO DATE

Yale University received an HCIA R2 award to support the PRIDE program, which was launched on March 25, 2015. The program grew out of the project leaders' experience in providing emergency medical care and their observations that individuals who call 911 for assistance after a fall tend to be physically weak and at risk for repeated falls. These patients frequently do not have a primary care physician (PCP) to address their underlying health issues or may not notify their PCP about the fall experience.

To address these issues, the PRIDE program uses a care management approach to improve the health of individuals in Connecticut's greater New Haven area who are living at home and have fallen or who are at risk of falling. The awardee recruits participants through a combination of strategies including (1) contacting individuals who call for 911 assistance after falling (also known as a "lift assist"), (2) speaking with emergency department (ED) patients who seek treatment for a fall or who are at risk for falling, and (3) speaking with attendees at community PRIDE education sessions. The awardee does not restrict enrollment to elderly individuals, but expects that a majority of enrollees will be over age 65. Yale University originally expected to enroll 1,600 individuals each year, or 4,800 individuals over the three-year program. Due to challenges in enrolling participants, however, program leaders revised their three-year enrollment goal to 1,000 participants by August 31, 2016.

PRIDE services include in-home fall risk assessments, preventive care, and increased linkages to primary care through a PRIDE paramedic and a nurse from a partnering visiting nurse agency (VNA). After enrollment, a PRIDE paramedic completes an in-home assessment, which considers multiple aspects of participants' health status and residential safety. At the conclusion of the assessment visit and if the participant accepts the service, the PRIDE paramedic schedules an appointment with the participant's PCP. Also, if the participant requires transportation assistance, the paramedic arranges for transportation to and from the initial PCP visit. The paramedic also schedules a home visit by a nurse from a partnering VNA. The PRIDE VNA nurse then completes an in-home patient health assessment to determine the need for ongoing nursing care, physical therapy, occupational therapy, or durable medical equipment. The VNA nurse may also communicate the assessment's findings to the participant's PCP.

Program leaders expect that PRIDE services will reduce falls that contribute to preventable ED visits, hospitalizations, and 911 calls. Ultimately, successful reductions in fall rates should reduce mortality and morbidity in the target population.

Yale University is developing a PRIDE payment model based on a Medicare Part B prospective, per beneficiary per month (PBPM) payment that is provided to emergency medical service (EMS) medical directors to reimburse frontline providers for the following bundle of services: (1) an in-home paramedic assessment, (2) a two-hour initial VNA visit, and (3) round-trip transportation to a primary care appointment. Patients would be eligible for the program if they (1) called 911 for a lift assist and declined EMS transport, (2) had a fall-related ED visit and were discharged home, or (3) contacted a program representative at a call center or community event due to a fear of falling. Though Medicare Part B is the proposed funding source, all patients in the EMS agency's geographic catchment area would be eligible, regardless of insurance coverage.

A. Summary of findings from the first program annual report

In the program narrative in our first annual report, we identified several successes achieved by Yale University during the first year of its cooperative agreement:

- The awardee experienced a number of delays in implementing PRIDE due to Yale University's hiring processes, institutional review board (IRB) procedures, and changes in recruiting strategy. By August 2015, the number of participants enrolled in PRIDE had increased to 33 participants, up from 5 participants during the previous month.
- Paramedics experienced in providing emergent care expressed appreciation for the care management and assessment training provided by the PRIDE program.
- PRIDE staff reported that quarterly in-person meetings helped break down communication barriers between EMS providers and VNA staff, creating an atmosphere of collaboration and shared learning.

We also identified several initial challenges in implementing the PRIDE program and Yale University's strategy for addressing them:

- After experiencing lower-than-projected enrollment rates, Yale University expanded the participant criteria to include individuals who were concerned about experiencing a fall and broadened the recruitment approach to recruit participants after a 911 call, during an ED visit, or through self-referral.
- Some paramedics were dissuaded from joining PRIDE due to their heavy EMS work schedules and Yale University's extensive background check. PRIDE leaders engaged fire department and EMS leaders in recruiting paramedics.

Finally, we identified several early lessons learned by Yale University in implementing its program:

- Recognizing that the target population was nervous about a program involving in-home interventions, Yale University revamped its approach to communicating with potential participants by designing an informational brochure, holding information sessions at senior centers and town hall events, and leveraging university resources to operate a PRIDE call center.
- Yale University determined that 911 computer-aided dispatch data could not be used to identify potential program participants. Instead, the awardee developed an approach to use a PRIDE partner's existing information technology (IT) system and the availability of on-call PRIDE paramedics to enroll participants soon after a 911 call.

B. Summary of findings in this annual report

In the second year of its cooperative agreement, Yale University made progress in the following areas:

- Yale University enrolled an average of 92 participants per month from September 2015 to August 2016, up from 7 participants per month in the first year of operations. The total

number of enrollees as of August 2016 was 1,149, which represents about 38 percent of the awardee's 3,000 projected participants.

- Yale University completed 709 paramedic assessments and 336 VNA assessments, as of August 2016. 53 participants requested transportation services to their PCP appointments.

Over the past year, Yale University also made several changes to its program:

- Hiring new staff to support PRIDE central management, increasing enrollment from patients in the ED, and improving communication with first responders who make PRIDE referrals
- Refining enrollment criteria for participants recruited within the ED to include patients who are admitted to the hospital for a one- to two-night stay and to exclude patients with dementia
- Adapting the community recruitment strategy to increase the number of events each month, schedule events with other activities that draw older adults, and invite PRIDE paramedics to address potential participants' concerns about home visits
- Developing guidance documents that clarify roles, responsibilities, and expectations of multiple PRIDE staff who coordinate to enroll participants and complete in-home assessments

Below we note the key challenges that Yale University has worked to address in the second year of its cooperative agreement.

- The 911-based recruitment approaches considered in the first year of operations, such as using computer-aided dispatch data or notifications from an EMS partner, have not been effective due to delayed data availability and reliance on partner resources. Instead, Yale University is focused on referrals from first responders who conduct the 911 lift assist calls. To encourage referrals, the awardee created a 24-7 hotline for first responders and hired a dedicated liaison for fire departments and EMS agencies. In addition, Yale University has developed a financial incentive program that rewards first responders for referrals.
- As enrollment increased, Yale University experienced a backlog of home visits. In the last year, the awardee addressed the backlog somewhat by using IT to improve home visit scheduling processes, transitioning to a shift-based schedule to increase paramedic availability, and partnering with a fifth VNA. Yale University will continue to recruit paramedics by increasing program awareness though recruitment fairs.
- To increase participant engagement in the PRIDE program and reduce the percentage of enrollees who decline home visits, Yale University has implemented the following changes to program operations: (1) using new IT tools to schedule the paramedic's home visit when the participant enrolls, (2) encouraging PRIDE staff to discuss the value of home visits with potential participants during the enrollment process to clarify any misperceptions about the program, and (3) placing reminder phone calls before scheduled visits and rescheduling if participants' or caregivers' availabilities change. In the coming year, the awardee plans to provide participants with a two-part financial incentive payment for enrollment and completion of the program.

As Yale University enters the final year of its cooperative agreement, it is anticipating the following challenges and successes:

- Yale University plans to recalculate the Medicare Part B prospective, population-based payment for EMS medical directors to reimburse frontline providers for PRIDE services. This payment creates an incentive for local EMS agencies to reduce non-reimbursed lift assist calls and places the financial risk of program management on the local EMS medical director. To ameliorate this risk, the awardee proposes to phase in the payment model, which would initially provide a higher quarterly payment that would be adjusted over time to account for region-specific factors.
- Yale University delayed recalculating the PBPM amount due to data limitations related to the expected number of people who would use PRIDE services in a given region and the degree to which program operating costs would be impacted by the association with a university. To support the calculation, the awardee is planning to hire a health economist with an actuarial background to complete PRIDE cost projections.

Table 1. Yale University: PRIDE characteristics at a glance

Program characteristic	Description
Purpose	Through in-home interventions and increased linkages to PCPs, Yale University's PRIDE program aims to reduce falls and other medical emergencies that contribute to preventable ED visits, hospitalizations, and 911 calls.
Components	Care management (primary)
Target population	Individuals in the greater New Haven area of CT who have fallen or who are at risk of falling. Yale does not restrict enrollment to elderly individuals, but anticipates that a majority of enrollees will be over age 65.
Theory of change/theory of action	Yale seeks to reduce falls and other medical emergencies through in-home paramedic and VNA fall risk assessments, preventive care, and increased access to primary care.
Payment model	Capitated payment for care management/coordination services
Award amount	$7,159,976
Launch date[a]	March 25, 2015
Setting	Participants' homes
Market area	Urban and suburban
Market location	Greater New Haven, CT
Outcomes	Successful reduction in lift assist calls and other medical emergencies should reduce mortality and morbidity, ED visits, and total expenditures in the target population.

[a]After a planning period, the awardee's program began to operate as of this date.

ED = emergency department; PCP = primary care physician; VNA = visiting nurse agency

III. FINDINGS FROM THE IMPLEMENTATION EVALUATION

The findings in this section are based on the evaluation team's analyses of (1) self-reported information submitted by Yale University in quarterly progress reports to the implementation and monitoring contractor and (2) qualitative information gathered during telephone interviews with program staff from June 20 through June 24, 2016. For the analyses of Yale University's self-reports, we reviewed the following documents that were submitted to the implementation contractor and that cover the awardee's activities through August 2016: program operating plans, self-measurement and monitoring plans, program narratives, progress reports, and supplemental materials.

The evaluation team used semi-structured protocols to conduct telephone interviews with the following program staff:

- PRIDE program leaders at Yale University
- PRIDE program management staff, including central office staff and the fire chief liaison
- Program staff who enroll participants and deliver services, including PRIDE paramedics, VNA nurses, and research assistants working in the ED

The protocols were tailored to each type of informant and included questions related to changes in program operations and factors influencing program implementation. After obtaining consent from the interviewees, the evaluation team audio-recorded and transcribed all interviews.

To understand the implementation experience, we used the Consolidated Framework for Implementation Research (CFIR) methodology. This framework incorporates a core set of domains and constructs based on a systematic review of the literature on implementation science.[2] It can be used to identify the drivers of implementation effectiveness in specific settings. The evaluation team coded the transcripts with codes that correspond to program components (such as enrollment and payment methodology) and to key drivers identified in the CFIR framework (such as the perceived relative advantage of the intervention). The evaluation team then extracted and analyzed the coded text that pertains to the research questions identified in Section I.B.

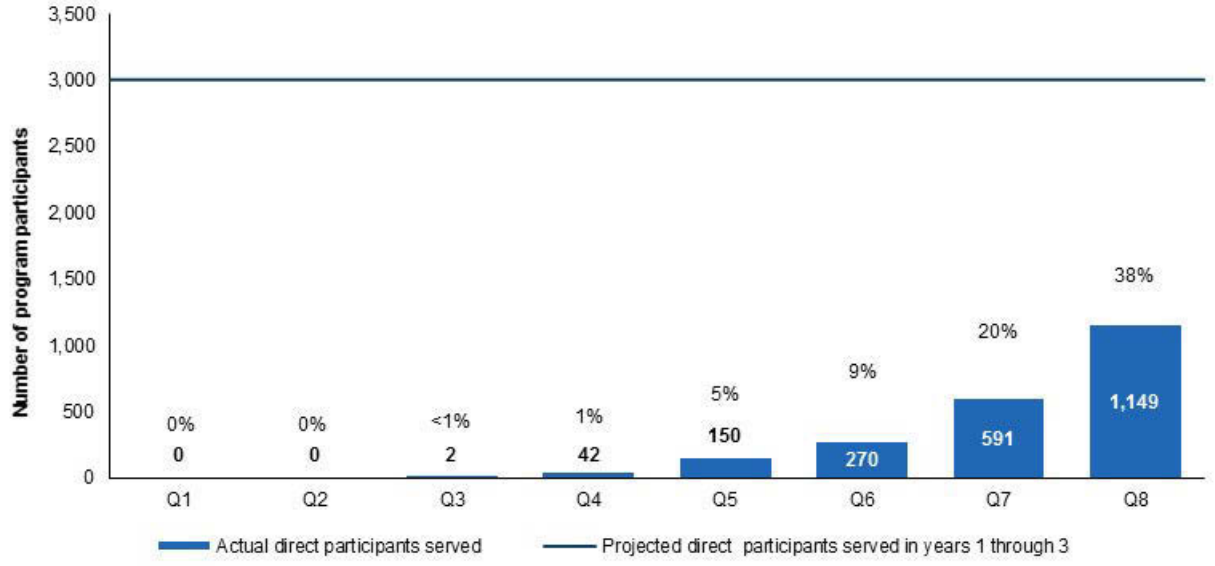
The rest of this chapter presents a synthesis of our findings from the implementation evaluation on enrollment, on the service delivery model, and on the payment model. Each area includes an update on Yale University's implementation progress during the second program year, followed by a description of the factors that facilitated or hindered this progress, including program changes.

[2] Damschroder, Laura J., David C. Aron, Rosalind E. Keith, Susan R. Kirsch, Jeffrey A. Alexander, and Julie C. Lowery. "Fostering Implementation of Health Services Research Findings into Practice: A Consolidated Framework for Advancing Implementation Science." *Implementation Science*, vol. 4, August 7, 2009.

A. Program enrollment

Overall, Yale University reported to the implementation and monitoring contractor that it directly served 1,149 participants from March 2015 (launch of its program) through August 2016, which represents about 38 percent of its 3,000 projected direct participants (Figure 1). The awardee originally expected to enroll 4,800 individuals over the three-year program but revised the projection due to challenges in enrolling participants.

Figure 1. Projected versus actual cumulative direct participants served through year 2, as of August 31, 2016



Source: Enrollment data from the implementation and monitoring contractor, program quarters 1 through 8 (September 2014–August 2016).

Note: Projected direct participants served reflects the cumulative and unique number of individuals that the awardee expects to serve in the program through August 2017. Direct program participants refers to the total number of unique participants who have received services funded directly by the HCIA R2 award from program launch through the eighth program quarter. Yale University does not have indirect program participants.

During the second year of program implementation, Yale University continued to recruit and enroll participants through the three recruiting mechanisms that were operational by the end of the first year. The following findings are based on the awardee's self-monitoring data from May 2016:

- A little less than one half of the participants enrolled in the PRIDE program in the ED after seeking medical care for a fall or expressing a fear of falling.
- A little more than one-half of PRIDE participants are considered self-referrals who enrolled during community-based program education sessions or after contacting the PRIDE call center to express interest in the program.
- Enrollment after a 911-initiated lift assist—Yale's original recruitment approach—accounted for approximately one in twenty PRIDE enrollees.

Yale University's progress in meeting its three-year enrollment goal was influenced by several factors, including hiring new staff, using technology in new and more efficient ways, adapting the enrollment and recruitment processes, and expanding the enrollment criteria for participants recruited in the ED. These changes were designed to address enrollment barriers that the awardee faced during the first program year, including difficulties with hiring sufficient program staff, finding effective strategies to incorporate technology into workflows, and identifying and recruiting patients who would benefit from the PRIDE program. Yale University implemented most changes described below into the enrollment process toward the middle or end of the second program year, which appeared to increase enrollment rates. By August 2016, the end of the second program year, 1,149 new participants had enrolled in PRIDE, up from 42 participants in August 2015.

First, Yale University hired a number of new staff in an effort to grow enrollment rates. For example, the awardee hired a central office staffer to manage paramedics' schedules, organize community outreach efforts, and oversee the ED researchers. In addition, Yale University hired new ED researchers to expand PRIDE recruitment to a second ED within the Yale New Haven Health System. Unlike previous ED researchers, the new hires were nursing and public health graduate students who had experience with health care, research, and use of Epic (the hospital system's electronic medical record system). Finally, the awardee hired a local fire chief to act as a liaison between program leaders and partnering fire departments or EMS agencies. The fire chief provides formal and informal education sessions to increase awareness of the PRIDE program, encourages first responders to refer potential enrollees to the program, and collects feedback from first responders about how Yale University might further enhance partnerships with fire departments and EMS agencies.

In the past year, Yale University used IT to replace inefficient, manual enrollment procedures by both optimizing existing tools and acquiring new tools. The awardee expanded its use of REDCap, a cloud-based data management application, to serve as a central repository for all PRIDE participant data, rather than focus solely on collection of assessment data. In addition, Yale University recently established a PRIDE-specific hotline to receive first responders' referrals based on lift assist calls and to address potential participants' questions or expressions of interest. The hotline supplements (and may eventually replace) the PRIDE call center, which was established in the first year of operations with university-wide resources. The new hotline operates 24-7 and allows for rapid response to a referral, thus avoiding the delay associated with faxing and other means of transmitting referrals from the call center.

Yale University continued to adapt its recruitment methods to improve participant enrollment by refining some process changes and abandoning others, after encountering unanticipated challenges or finding limited impact on enrollment. For example, after enrolling large numbers of participants at each community event, the awardee scheduled more events, with the goal of 20 events in some months. Yale University identified best practices to determine where and when to schedule the events, including scheduling events just after another activity that draws older adults (such as bingo or lunch at a senior center). In addition, the awardee increased the number of PRIDE paramedics who were available to attend community events and enroll participants by transitioning them away from ad hoc schedules (based on appointments

with participants) to shift-based schedules. In the coming year, Yale University will further support enrollment through all methods with a two-part participant incentive system for participants who enroll and complete both in-home assessments.

Finally, in May 2016, Yale University expanded the enrollment criteria for PRIDE participants who enrolled in the ED. Initially, Yale University specified that ED researchers should enroll PRIDE participants who were admitted to the ED for medical care after a fall, or who were found to be at risk of falling, and discharged to their home. Recently, Yale University expanded the criteria to encourage ED researchers to enroll ED patients who were admitted to the hospital for a one- to two-night stay, perhaps for observation. The enrollment criteria were further refined to exclude patients with dementia after PRIDE paramedics observed that severe cognitive impairments hindered participants' abilities to engage in the in-home fall risk assessment.

> "I think a lot of the changes that have come have really made the program run more smoothly. And I think it's different from when I first started, but different in a really good way. I think the program keeps getting better."
>
> — *ED researcher*

B. Implementation of the service delivery model

As the rate of PRIDE enrollment increased through the second year of implementation, Yale University continued to refine program operations to schedule and complete more in-home assessments. According to the awardee's self-monitoring data, the average number of monthly PRIDE paramedic assessments grew from 2 in the first program year to 58 in the second program year. At the same time, the average number of completed VNA assessments increased from less than 1 per month in the first year to 28 per month in the second year. In comparison, few participants requested transportation to their PCP appointments; the average number of transports increased from less than 1 per month in the first program year to 4 per month in 2016.

The factors that facilitated or hindered the implementation of the service delivery model in the second program year fall into three categories.

- **Intervention characteristics** reflect features inherent in a program, such as who developed it and the extent to which it can be adapted to other local contexts.
- **Implementation processes** are either strategies, such as engaging stakeholders, or tools, such as information databases, that awardees use to support program implementation at a given location.
- **The organizational and external context** comprises other factors that may influence implementation. These factors are the structural, political, and cultural characteristics of the implementing organization and the external context in which the program operates, including local, state, and national policies, as well as the economic, political, and social environment.

1. Intervention characteristics

The characteristics of the PRIDE program have created implementation advantages and challenges. PRIDE staff developed a series of guidance documents in the second program year to help address the complexity of coordinating across multiple settings to enroll participants and deliver services. These documents describe the roles, responsibilities, and expectations of staff who enroll and deliver services to participants. In addition, the documents support new staff and also provide clarification as Yale University refines program operations to increase enrollment and improve service delivery.

> "Everyone has clear, defined roles and responsibilities of what they have to do. . . . There's no way to have any confusion. . . . Everyone's on the same page due to the changes . . . that happened within the last, I'd say, three to six months."
>
> — *PRIDE paramedic*

Although the PRIDE program design seeks to create connections between participants and PCPs, ultimately these services may not align with the needs of the target population. Specifically, the PRIDE program offers two PCP-related services during the paramedic's home visit: (1) scheduling an appointment with a participant's PCP (or a local clinic if the patient does not have a PCP) and (2) arranging for transportation to and from the PCP visit. However, PRIDE paramedics found that participants frequently declined these services, saying that they already had appointments with their PCPs or that a family member would provide transportation. Self-monitoring data from August 2016 submitted by the awardee indicated that 53 of 1149 enrollees, or 4.6 percent, received transportation services to a PCP appointment.

2. Implementation processes

During the second program year, Yale University focused on (1) using IT to more efficiently schedule home visits and (2) recruiting more program staff and partners to address the backlog in home visits. As enrollment increased, the awardee experienced a backlog of home visits due, in part, to the use of manual processes to schedule the visits. Based on the increasing number of participants signing up for and then declining the assessments, program leaders suspected that the backlog in scheduling the home visits had impacted participant engagement. The awardee addressed the backlog somewhat by implementing ShiftPlanning, an online scheduling tool to streamline scheduling of paramedics' home visits. The new web-based scheduling and management tool allows PRIDE staff to view the paramedics' work schedules and arrange home visits at the time of enrollment. Yale University is considering expanding its use of ShiftPlanning to VNA home visits, which would enable paramedics to arrange the visiting nurse assessments using the online tool rather than calling each VNA.

> "That way there's no confusion about what time he has this patient, where are they going. . . . It's going to sound crazy, but one app simplified a host of issues. . . . It's so much easier."
>
> — *PRIDE paramedic*

Yale University is focused on hiring new PRIDE paramedics to address the backlog in scheduled home visits caused by limited availability of staff resources. The awardee's new recruitment strategy emphasizes the program benefits, a shift-based schedule, and stable

> "[Paramedic work] revolves around transports—going to the ER, going hospital to hospital. This whole community paramedic thing opens up a whole new role and responsibility for us. . . . It's exciting to a lot of people."
>
> — *PRIDE paramedic*

compensation and is targeted at paramedics who enjoy community-oriented work. To implement its recruiting plans, Yale University plans to hold recruitment fairs where paramedics can learn about the program and submit applications. The awardee also is relying on both the fire chief who serves as a fire department liaison and current PRIDE paramedics to act as resources for other paramedics who are interested in learning more about the program.

PRIDE has also experienced a backlog in VNA home visits. To address this, they partnered with a fifth VNA.

3. Organizational and external context

Organizational factors, including IRB requirements and the program staff's commitment to the success of the program, presented challenges to and facilitators of program implementation, respectively. PRIDE leaders reported that Yale University's IRB requirements continued to delay program implementation and hindered the awardee's ability to adapt program operations in response to new challenges. For example, PRIDE leaders waited a full quarter for IRB approval of the financial incentive program, radio and TV advertisement scripts, and briefing materials for community events.

PRIDE leaders and staff are passionate about fall prevention and committed to the success of the program. All interviewees, from leaders to staff, expressed belief that the program was having a positive impact on frail and isolated individuals. Our interviews indicated that PRIDE staff were dedicated to making the program succeed by increasing enrollment and streamlining operations.

> "A lot of these patients are just not connected to the world around them, and they really need help because they don't know what to do. It's probably our biggest impact. . . . Step in there and give them all this advice about fall prevention, and at the same time giving them tips and tricks to other medical things."
>
> — *PRIDE paramedic*

The community's misperceptions of the value of PRIDE services presented a challenge to participant engagement. After data from the first half of 2016 showed that, on average, 26 percent of new participants each month declined the paramedic's assessment and 36 percent declined the VNA assessment, Yale University realized that participants may be confused about the services offered by the program. In response, the awardee has taken steps to increase participant engagement. Yale University leaders have encouraged PRIDE staff to discuss the value of the home assessment, and the VNA visit in particular, with potential participants during the enrollment process to clarify any misperceptions about the program. In the coming year, Yale University also plans to implement a financial incentive for participants who complete the program and to encourage VNA staff to join the community events to better address any misperceptions about the program.

C. Development of the payment model

The fundamental structure of Yale University's proposed payment model is unchanged in the second program year. The model continues to include a Medicare Part B prospective, population-based payment made to EMS medical directors to reimburse frontline providers for the following bundle of services: (1) an in-home paramedic assessment, (2) a two-hour initial VNA visit, and (3) round-trip transportation to a primary care appointment. Yale University recently refined the payment model's patient eligibility criteria to better align with current PRIDE enrollment methods. Specifically, patients would become eligible if they called 911 for a lift assist and declined EMS transport, had a fall-related ED visit and were discharged home, or contacted a program representative at a call center or community event after a fall or due to a fear of falling. Though Medicare Part B is the proposed funding source, all patients in the EMS agency's geographic catchment area would be eligible, regardless of insurance coverage.

Yale University recognizes the importance of calculating the correct payment to the EMS agencies, which would be a single PBPM amount. The PBPM payment creates an incentive for local EMS agencies to reduce nonreimbursed lift assist calls. The program also places the financial risk of program management on the local EMS medical director. To ameliorate this risk, Yale University proposes to phase in the payment model, which would initially provide a higher quarterly payment that would be adjusted over time to account for region-specific factors.

Yale University delayed recalculating the PBPM amount due to data limitations. To calculate an accurate PBPM amount (initially estimated to be $2.13), the awardee needs a better understanding of the expected number of people who would use PRIDE services in a given region. The recent growth in PRIDE participants made estimating the potential eligible population difficult. In addition, it is not yet clear which program operating costs are impacted by the association with a university. For example, Yale University applies a loading factor on research projects, which inflates operating costs. These increased costs are offset by university-based services provided to the PRIDE program below market rate, such as the call center and marketing assistance. A final complication is determining which aspects of PRIDE are specific to operations in the greater New Haven area and which are generalizable to different regions, for example high Medicare Advantage penetration. To revise the PBPM calculation, the awardee must first project and model the expected operating costs with different scenarios and for different regions. Yale University is currently hiring a health economist to support the PBPM recalculation.

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IV. FINDINGS FROM THE ANALYSIS OF MEDICARE ENROLLMENT AND CLAIMS DATA

This section presents baseline characteristics of Medicare fee-for-service (FFS) beneficiaries in each of the three recruitment methods: ED visit, 911 lift assist, and self-referral. We measured the characteristics during the 12 months before each beneficiary's enrollment into the intervention; enrollment is defined as the beneficiary consenting to participate in the intervention. The characteristics include demographic information as well as summary statistics on expenditures and the health care utilization of beneficiaries by recruitment method. Future analyses will focus on participants recruited through ED visits only because our ability to identify a comparison group for the 911 lift assist and self-referral recruitment methods is limited. For the purpose of our evaluation, the treatment group consists of individuals enrolled in Medicare FFS, Medicaid, or both who received services for a fall-related event in the ED of Yale New Haven Hospital.[3] Therefore, we focus our description of baseline characteristics on ED visit participants and how beneficiaries from the other two recruitment methods compare with ED visit participants. Because there are few Medicaid patients enrolled through the ED, we did not report their baseline characteristics.

A. Baseline characteristics of the treatment group

Yale University began to enroll participants in the PRIDE program in April 2015. As of May 31, 2016, the awardee had enrolled 569 unique participants in the program. The majority of participants (543 individuals) are Medicare or Medicaid beneficiaries. There are 519 Medicare participants and 282 Medicaid participants (258 individuals participate in both Medicare and Medicaid). The remaining 5 percent (26 individuals) either have other sources of health care coverage or they are uninsured; these participants are not included in our analysis.

In presenting the baseline characteristics, we restricted the treatment group to Medicare beneficiaries who were enrolled in Medicare FFS, both Parts A and B, with Medicare as the primary payer when their eligibility for awardee-provided services began (that is, their enrollment date) and who met all program criteria for a period of 90 days during the baseline year (the 365 days immediately before their enrollment). In addition, they must have been enrolled in the awardee's program on or before May 31, 2016, in order to ensure a sufficient run-out period to capture nearly all claims for the most recent beneficiaries. The calendar period covered by the baseline quarters is based on the enrollment date for each participant and will therefore vary by participant. After we excluded patients who did not meet the above criteria, a total of 329 Medicare FFS beneficiaries were included in the analysis of baseline characteristics for this report. One hundred ninety-three beneficiaries were recruited via the ED visit method, 45 beneficiaries were recruited via the 911 lift assist method, and 95 beneficiaries were recruited via the self-referral method (one beneficiary was enrolled through both a 911 lift assist and an ED visit, one beneficiary was enrolled through an ED visit and self-referral, and 2 beneficiaries were enrolled through a 911 lift assist and self-referral).

[3] Yale University expanded its efforts to recruit participants from the ED at Yale New Haven St. Raphael's campus in February 2016.

The Medicare FFS beneficiaries recruited by Yale University through the ED are predominantly elderly, female, and white (Table 2). Ninety percent of them are older than 65, and 44 percent are older than 85. Like Connecticut's Medicare FFS beneficiaries, 80 percent of whom are white, and 10 percent are black,[4] the ED visit beneficiaries are predominantly white (79 percent); 17 percent of them are black. Compared with 16 percent of Medicare beneficiaries nationwide and 13 percent of Medicare beneficiaries in Connecticut,[5] 22 percent of ED visit beneficiaries were originally eligible for Medicare because of a disability. Two percent were entitled to Medicare because of end-stage renal disease (ESRD). Compared with 21 percent of Medicare beneficiaries nationwide and 24 percent of Medicare beneficiaries in Connecticut,[6] ED visit beneficiaries who are dual eligibles represent 34 percent of all ED visit beneficiaries, reflecting a high level of social need. ED visit beneficiaries have a mean hierarchical condition categories (HCC) risk score of 2.32 (relative to a national mean risk score of 1.00), reflecting their poorer health status and greater needs for care than the general Medicare FFS population.

The Medicare FFS beneficiaries recruited by Yale University through 911 lift assist are more similar to ED visit beneficiaries than self-referral beneficiaries to ED visit beneficiaries. Compared with ED visit beneficiaries, 911 lift assist beneficiaries are more likely to be dual eligibles (44 percent compared with 34 percent of ED visit beneficiaries); they also have a higher mean HCC score (2.63). In contrast, self-referral beneficiaries are more likely to be female (81 percent) and white (87 percent), and to have a lower mean HCC score (1.72).

[4] Kaiser Family Foundation, "Distribution of Medicare Beneficiaries by Race/Ethnicity in 2015." Available at http://kff.org/medicare/state-indicator/medicare-beneficiaries-by-raceethnicity/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed October 2016.

[5] Kaiser Family Foundation, "Distribution of Medicare Beneficiaries by Eligibility Category in 2013." http://kff.org/medicare/state-indicator/distribution-of-medicare-beneficiaries-by-eligibility-category-2/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed October 2016.

[6] Kaiser Family Foundation, "Dual Eligibles as a Percent of Total Medicare Beneficiaries in FY 2011." Available at http://kff.org/medicaid/state-indicator/duals-as-a-of-medicare-beneficiaries/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D. Accessed October 2016.

Table 2. Baseline year demographic characteristics of Medicare FFS beneficiaries enrolled in the treatment group of the awardee's program through May 31, 2016

	ED visit (N=193)		911 Lift Assist (N = 45)		Self-Referral (N=95)	
Characteristics	**Number**	**Percentage**	**Number**	**Percentage**	**Number**	**Percentage**
Age as of enrollment date						
Younger than 65	20	10	6	13	13	14
65 to 74	45	23	7	16	14	15
75 to 84	43	22	15	33	26	27
85 and older	85	44	17	38	42	44
Gender						
Female	127	66	27	60	77	81
Male	66	34	18	40	18	19
Race						
White	153	79	38	84	83	87
Black	32	17	7	16	12	13
American Indian, Alaska Native, Asian/Pacific Island American, or other	4	2	0	0	0	0
Hispanic	4	2	0	0	0	0
Original reason for Medicare eligibility						
Old age and survivor's insurance	148	77	32	71	71	75
Disability insurance benefits	42	22	11	24	23	24
End-stage renal disease (ESRD)[a]	3	2	2	4	1	1
Hospice[b]	0	0	0	0	0	0
Medicare/Medicaid dual status, percentage dual[b]						
HCC score[c]						
Mean		2.32		2.63		1.72
25th percentile		1.03		1.21		0.87
Median		1.77		2.17		1.37
75th percentile		3.02		3.6		2.32

Source: Mathematica analysis of information from awardee's finder file and Medicare claims and enrollment data as of May 31, 2016

Note: The baseline year is defined as the 365 days before each beneficiary's enrollment date. The enrollment date is defined as the date on which the participant signs a consent form after being identified through one of three recruitment methods (911 lift assist, ED visit, and self-referral). For future reports, the enrollment date will be the date on which we first have evidence that a beneficiary received treatment in the Yale New Haven Hospital ED for a fall-related event. All beneficiary characteristics were measured during or as of the end of the baseline year.

[a]Includes participants with both a disability and ESRD.

[b]Identified in the last month of each beneficiary's baseline year.

[c]We calculated HCC scores by using the most recently available HCC algorithms developed by CMS. For participants who reside in a long-term care or similar facility, we used the HCC institutional algorithm. For participants enrolled for 12 or fewer months as of the start of their enrollment, we used the new enrollee algorithm. For participants with ESRD, we used the ESRD HCC algorithm and assigned the HCC score based on the participant's age and whether he or she had a transplant, was in an institution, or was a new enrollee. We used the HCC community algorithm for all other enrollees.

FFS = fee-for-service; HCC = hierarchical condition category

Consistent with the high HCC scores, ED visit beneficiaries had higher expenditures in the year prior to enrollment. In Table 3, we report baseline utilization and expenditure data for a common set of measures, including the four CMMI core measures. Yale University expects to reduce ED visits and hospital admissions within 30 days of the intervention. We examined the baseline cost of care by calculating average per beneficiary per month (PBPM) Medicare payments in total and by major types of services. Relative to the Connecticut Medicare FFS beneficiaries' average of $917 in 2014,[7] the total average PBPM Medicare payment during the baseline year was $3,004 for ED visit beneficiaries. As expected, the average PBPM payment in the fourth quarter of the baseline year was the highest quarterly PBPM payment because it included the recruitment ED visit; total PBPM payments ranged from $2,281 to $4,560. For ED visit beneficiaries, the average PBPM Medicare payment for acute inpatient care ($1,372) was the largest driver of the total cost of care; this payment is almost 50 percent of the total cost of care. Average PBPM payments for physician services ($480), outpatient services ($410), home health services ($347), and skilled nursing facilities ($334) each contributed approximately 10 to 15 percent of the total cost of care. Quarterly expenditures for acute inpatients services were relatively stable in the first three baseline quarters and increased significantly in the fourth quarter of the baseline year. Quarterly expenditures for physician, outpatient, home health, and skilled nursing facility services were relatively stable over time, although all average payments were higher in the fourth quarter of the baseline year.

Compared with ED visit beneficiaries, the total average PBPM Medicare payment during the baseline year was a little higher for 911 lift assist beneficiaries ($3,442) and much lower for self-referral beneficiaries ($1,352). The quarterly average PBPM estimates for 911 lift assist beneficiaries increased over time, whereas these estimates were stable for self-referral beneficiaries. Compared with ED visit beneficiaries, for whom acute inpatient services were almost 50 percent of total cost of care in the baseline year, payments were more equally distributed across services for 911 lift assist and self-referral beneficiaries.

The baseline rate of acute care hospitalizations for ED visit beneficiaries was 1,203 per 1,000 Medicare FFS beneficiaries in the baseline year—higher than the Connecticut average in 2014 of 291 per 1,000 Medicare FFS beneficiaries.[8] Fifty-six percent of ED visit beneficiaries had at least one hospitalization during the year before enrollment. The rate of outpatient ED visits for ED visit beneficiaries (1,547 per 1,000 Medicare FFS beneficiaries in the baseline year, or 65 percent of beneficiaries) was more than three times higher than the 2013 national rate of 454 per 1,000 Medicare FFS beneficiaries.[9] The higher rate of outpatient ED visits among

[7] Unless otherwise noted, national and state data in this paragraph is from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf.

[8] Unless otherwise noted, national and state data in this paragraph is from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf.

[9] National outpatient ED rate calculated from the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf.

beneficiaries suggests that there is an opportunity to reduce the rate of outpatient ED visits through PRIDE program services. The baseline rate of ambulatory observation stays (607 per 1,000 beneficiaries per year) was more than 10 times greater than the 2014 national average of 58 per 1,000 beneficiaries.[10] The percentage of discharges with a 30-day readmission among ED visit beneficiaries (20 percent per discharge) in the baseline year was slightly higher than the Connecticut average percent in 2014 for Medicare beneficiaries (18 percent per discharge); 11 percent of all ED visit beneficiaries had a readmission during the baseline year. At baseline, the rate of primary care visits in any setting was 10,487 per 1,000 Medicare FFS beneficiaries per year for ED visit beneficiaries. This rate falls by 17 percent to 8,694 per 1,000 Medicare FFS beneficiaries if we restrict the settings to the ambulatory setting. The baseline rate of specialty care service use in any setting was 20,808 per 1,000 Medicare FFS beneficiaries per year; this rate falls by 41 percent to 12,173 per 1,000 Medicare FFS beneficiaries if we look at ambulatory settings only. Similar to the trend observed in expenditures for ED visit beneficiaries, quarterly rates for most utilization measures were markedly higher in the fourth quarter of the baseline year than in other quarters. Primary care and specialist visits in ambulatory settings and the percentage of readmissions among all ED visit beneficiaries were relatively stable across the four baseline quarters, whereas the percentage of 30-day readmissions trended downwards across the four quarters.

Compared with ED visit beneficiaries, most utilization of hospital-related services (including acute hospital admissions, outpatient ED visits, and observation stays) was approximately one-third lower for 911 lift assist beneficiaries and approximately two-thirds lower for self-referral beneficiaries. The percentage of discharges with a 30-day readmission was lower for 911 lift assist beneficiaries (10 percent) and self-referral beneficiaries (14 percent) than it was for ED visit beneficiaries (20 percent). However, a greater percentage of self-referral beneficiaries had a 30-day readmission than did 911 lift assist beneficiaries. The latter had rates of primary care and specialty care visits that were similar to those of ED visit beneficiaries. Self-referral beneficiaries had lower rates of primary care visits in any setting, primary care visits in ambulatory settings, and specialty visits in any settings; however, specialty visits in ambulatory settings rate were similar for self-referral and ED visit beneficiaries. No distinct pattern in quarterly rates was observed for 911 lift assist or self-referral beneficiaries.

Overall, beneficiaries in the PRIDE program who enrolled through an ED visit had higher expenditures and utilization relative to the national and Connecticut averages for all Medicare FFS beneficiaries, suggesting that there is the potential to improve care for all participating beneficiaries. However, the baseline characteristics, health care expenditures, and utilization rates suggest that the three recruitment arms are enrolling different Medicare FFS populations. The populations recruited through the ED visit and 911 lift assist were more similar to each other in the baseline year, whereas self-referral beneficiaries were healthier and used fewer health care resources. Total expenditures for ED visit beneficiaries were similar to total expenditures for 911 lift assist beneficiaries, but ED visit beneficiaries used more hospital-related services than did 911 lift assist beneficiaries. Self-referral beneficiaries had lower expenditures and utilization rates in all measures except specialist visits in ambulatory settings.

[10] See the Medicare Payment Advisory Commission, "A Data Book: Health Care Spending and the Medicare Program," June 2016. Available at http://www.medpac.gov/docs/default-source/data-book/june-2016-data-book-health-care-spending-and-the-medicare-program.pdf.

For the next quarterly report, we will focus on ED visit beneficiaries only. We will continue to report baseline health status characteristics as well as utilization and expenditure measures. We will also develop preliminary measures of the implementation of the program using data provided by the awardee.

B. Updated assessment of program evaluability

Mathematica has conducted a detailed reassessment of the evaluability of each of the 39 HCIA R2 awardees—that is, the extent to which we believe we can produce meaningful estimates of program effects on Medicare and Medicaid spending, hospital admissions, unplanned readmissions, ED visits, and other important outcomes specific to each awardee. Our primary assessment of evaluability focused on three evaluability elements presented in Table 3: (1) whether the projected enrollment at the end of each cooperative agreement is large enough to detect a 20 percent effect on expenditures, which is a large program effect; (2) whether claims can identify the primary expected effects; and (3) whether we can identify a credible comparison group by using claims data.

Table 3. Assessment of HCIA R2 awardee evaluability, as of June 1, 2016: Yale University

Evaluability domain	Response
Projected Medicare FFS population with 6 months of program exposure	309
Projected Medicaid population with 6 months of program exposure	78
Minimum detectible effect (MDE) sample size requirement to detect 10% effect	
Total expenditures	1,437
Likelihood of all-cause hospitalizations	861
MDE sample size requirement to detect 20% effect	
Total expenditures	359
Likelihood of all-cause hospitalizations	215
Participation/Selection bias of concern	Limited or no concern
Full implementation of new intervention	Fully implemented new intervention relative to baseline
Claims sufficient to identify intervention and comparable comparison group?	Yes, an event or utilization/expenditures used to identify treatment group
Likelihood of solid comparison group	Some issues, but probably surmountable; expect to select a comparison group
Do claims identify the primary expected effects	Yes
Core outcomes estimation method	None
Primary reason for no rigorous evaluation	Too few treatment beneficiaries for primary outcomes
Survey data for treatment group that will be analyzed	Staff and beneficiary surveys
Implementation data that will be analyzed	Awardee has provided some participant-level data about the receipt of intervention services (paramedic visit and VNA visit).

At this point, we do not anticipate being able to conduct a rigorous impact analysis for the awardee because projected enrollment will not support detecting a 20 percent effect in total Medicare or Medicaid expenditures for each of the two groups of participants. A major limitation in our evaluation of the awardee's program is the fact that we are restricted to analyzing only one of three program components—that is, the treatment group beneficiaries who had an ED visit for a fall. We do not expect the projected enrollment in this treatment arm will support detecting a 20 percent effect in total Medicare or Medicaid expenditures. We will monitor enrollment and reassess evaluability should enrollment exceed our current expectations. Absent an impact evaluation, we will report on the rate of receipt of intervention services (for example, paramedic and VNA visits) from participant-level data that the awardee has provided. We will also report on the experiences of awardee staff and participants, based on our surveys.

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V. NEXT STEPS

A. Implementation evaluation

As Yale University enters the final year of its cooperative agreement, we will continue to review quarterly reports submitted by the awardee to the implementation and monitoring contractor. In addition, we will conduct telephone interviews with awardee leaders and program staff in summer 2017. During the interviews, we will focus on any recent changes to the program, obtain feedback on the enrollment process, and update our understanding of the challenges and facilitators involved in implementing each program component. We will also inquire about plans for sustainability or scalability and for the payment model beyond the end of the cooperative agreement. As we analyze the data collected through these activities, we will describe our findings in future reports.

B. Impact evaluation

The next steps in the impact analysis include monitoring enrollment and examining baseline characteristics among beneficiaries recruited through the ED arm of the intervention. At this point, we are concerned about whether there will be a sufficient number of participants in the ED arm to conduct a rigorous evaluation. If we revise our assessment of evaluability, we plan to select potential comparison beneficiaries from two hospitals with EDs in Hartford, Connecticut—Hartford Hospital and Saint Francis Hospital and Medical Center. We would use propensity score analysis to select comparison beneficiaries with baseline characteristics that align across the treatment and comparison groups.

C. Survey

To supplement our document reviews, interviews, and claims analyses, we are administering the following surveys:

- **A survey of non-clinician staff affiliated with the program.** The non-clinician survey was administered during the summer of 2016. The survey focused on the staff's implementation experience and on their perception of program effects on provider behavior and patient outcomes. Examples of non-clinician staff include paramedics, VNA nurses, ED researchers, and administrative staff. We expect to report the results of the survey in the third annual report in January 2018.
- **A survey of participants who received services from the program.** The survey will focus on the participants' experience in the program and on their perception of its effect on the delivery of care and health outcomes. We are preparing the survey instrument, and the survey is scheduled to be launched in May 2017.

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