SECOND ANNUAL REPORT

HCIA Complex/High-Risk Patient Targeting: Second Annual Report

MARCH 2016

PRESENTED TO:
Katherine Giuriceo
CMMI
7500 Security Boulevard
Baltimore, MD 21244

PRESENTED BY:
Wilhelmine D. Miller
NORC at the University of Chicago
4350 East-West Hwy, Suite 800
Bethesda, MD 20814
301-634-9431

NORC at the UNIVERSITY of CHICAGO

Contributors

Lynne Page Snyder

Britta Anderson

Emily Armstrong

Alana Knudson

Shriram Parashuram

Sarah Ruiz

Jennifer Satorius

Elaine Swift

Table of Contents

List of Exhibits

Executive Summary

This is the second annual report of the evaluation of the Health Care Innovation Award (HCIA) Complex/High-Risk Patient Targeting (CHRPT) portfolio by NORC at the University of Chicago, under contract with the Center for Medicare & Medicaid Innovation (CMMI). We present findings for 23 awardees that serve patients with medically complex conditions who are at high risk for hospitalization, re-hospitalization, emergency department (ED) visits, or nursing home stays. HCIA funding supports pilot testing, replication of established models, and the scaling of interventions to improve the quality of care and health while lowering overall health care cost.

At this mid-point in our evaluation, we find some early evidence of reduced utilization and improved quality of care. We also observe significant challenges that awardees face as they implement and work to sustain their programs. The HCIA projects in this portfolio take diverse approaches to reforming the delivery of health care services for adults and children with multiple comorbidities and functional disabilities. These approaches include coordination of care across transitions between inpatient and ambulatory care settings, multidisciplinary team-based care in clinics and out in the community, redesign of clinical care workflow and staffing, patient and caregiver education and coaching to improve self-management, and training for new and enhanced roles by in-home caregivers and others in the health care workforce.

Our evaluation builds on the awardee program descriptions, evaluation design, and initial findings presented in our first annual report (2014). We include qualitative information and analyses that encompass 36 months of HCIA funding, and claims-based analyses for at most eight quarters, and more typically six quarters, of program implementation.[1] We also present preliminary findings from five workforce surveys and three consumer surveys that NORC or individual awardees have developed and conducted over the past 18 months. Our findings remain preliminary and partial. Depending on when awardees' programs became operational and the length of their no-cost extension, if any, the quantitative results reported here account for between one-fourth and two-thirds of an awardee's full period of performance. In addition, in several cases NORC continues to work with individual awardees to specify and refine groups of Medicare or Medicaid beneficiaries sufficiently comparable to the awardees' participants to make valid comparisons and discern the impact of the interventions.

Given these qualifications, we see improvements—improved health, quality of care, or reduced cost—for approximately half of the CHRPT portfolio. These findings are corroborated by qualitative assessments demonstrating improved patient functioning, as well as patient and caregiver experience. Awardee strengths such as leadership and organizational culture, and payment policies (particularly through Medicaid) such as capitation or other reforms of traditional fee for service that accommodate provision of

[1] For 10 of the 23 CHRPT awardees, HCIA financial support for program operations ended 36 months after the initial award, on June 30, 2015. The remaining 13 awardees have no-cost extensions to fund program operations and sustainability planning for between six and eight months (six awardees) or 12 months (seven awardees).

supportive and social services are key conditions for successful implementation and the sustainability of innovative programs that serve complex and high-risk patients.

Overview of the Complex/High-Risk Patient Targeting Portfolio

Most awardees work with populations older than 65 years of age but some target younger adults and two exclusively serve high-risk children. Some of the awardees focus their efforts to address the needs of historically disadvantaged or underserved communities, which is reflected in the racial and ethnic composition of their program. Within the CHRPT portfolio, awardees serve:

- Adults with mental and developmental disabilities;
- Children with complex health conditions;
- Frail elders with multiple chronic conditions;
- Patients with late-stage illnesses;
- Adults with physical disabilities and multiple chronic conditions; and
- Adults with behavioral problems, mental illness, or cognitive impairment.

Enrollment targets that awardees proposed in their HCIA applications have, in most cases, been modified. Of the 19 CHRPT awardees who have set enrollment targets, only one (South Carolina Research Foundation) exceeded their initial goal within the three-year award period. Others (11 awardees) came close to reaching their target population goal (86 to 97 percent of their original planned enrollment), and some may do so during no-cost-extension (NCE) periods. Seven awardees had reached 65 to 77 percent of their enrollment target at the end of the first quarter of 2015.

CHRPT awardees have adapted a number of established models or developed new ones in their efforts to improve quality, improve health, and lower costs. Embedded in these models are theories of change and theories of action, the hypothesized mechanisms by which behavior change is motivated on the part of individuals and organizations. Some drivers relate to behavior change for participants and their family or informal caregivers, and others relate to change on the part of providers and institutions. One central driver of change for both participants and providers is that of communication. Most awardees in our portfolio use care coordination, often in conjunction with other models (e.g., self-management, medical home, trauma-informed care, home care).

In addition to populations targeted and program models, launch timeliness is an important aspect of an intervention's reach. Awardees typically encountered administrative delays. Pilots of new interventions faced additional preparatory tasks, compared with the 11 awardees that scaled up an existing model. With few exceptions, considerable time elapsed between award date and program launch for CHRPT awardees. About half were delivering services within six months. The period between award and launch ranged from just over two months (78 days) to well over one year (481 days). Most awardees began to enroll participants between five to seven months and eight to ten months post-award, with even longer time periods to reach full implementation.

Implementation Effectiveness

Across the CHRPT portfolio, awardees have experienced common challenges related to recruiting patients and caregivers and optimizing the targeting of their services and scarce resources; facilitating communication between patients and providers, and among providers; and engaging participants and their caregivers in the hard work of behavior change to improve self-management of chronic conditions.

The scope of awardees' work as a cohort includes both the coordination and delivery of care, redesign of workflow and clinical processes, creation of dedicated health information technology (HIT), and development of the health and home care workforce. These tasks are delivered in hospitals, in a variety of ambulatory care settings (e.g., hospital outpatient and emergency departments, physician offices), at skilled nursing facilities, and in the homes of intervention participants. Awardee interventions range in size from serving fewer than 200 participants in one city to tens of thousands of participants in a metropolitan region. The programs are likewise diverse in terms of geographic spread, ranging from a small clinical staff serving a single community to statewide interventions, to sites across several non-contiguous states. In addition, CHRPT interventions often include attention to assistive technology and/or durable medical equipment, reflecting the importance of long-term services and supports to effective health care for persons living with multiple chronic conditions. Patient navigation and care coordination may include facilitating the process of obtaining such technology or equipment, in-home assessments of related needs, and coaching of participants and caregivers about the appropriate use of assistive technology or durable medical equipment.

Targeting and Recruitment. Identifying and enrolling prospective participants is a critical early step in implementation. Effective targeting by level of patient risk requires access to person-level data for the population from which the program draws its participants and the capacity to analyze results and modify recruitment criteria or the intervention accordingly. Several awardees adjusted their targeting and recruitment as they learned more about their participants and were able to identify those for whom their innovation was most effective (Courage Kenny Rehabilitation Institute, University Emergency Medical Services, Providence Portland Medical Center). Relationships with providers or agencies serving the targeted population and referrals from affiliated programs often became an effective means for recruitment (Community Care of North Carolina, University of New Mexico). There is a continuum of approaches across the portfolio, with predictive data analytics at one end and reliance on partners at the other; most awardees have blended aspects of both analytics and relationships in their efforts to target and recruit participants.

Communication and Health Information Technology (HIT). The capacity of HIT to fulfill its potential in facilitating communication is mixed, reflecting challenges related to interoperability, legal and regulatory obstacles to data-sharing, and the capacity of awardees and their partners to use data to improve their respective operations. Almost all awardees have a dedicated, in-house or internal data system to support their intervention. In addition, some have developed a HIT platform and data warehouse that enables data gathering, analytics, and dissemination of analyses across sites or with partners, creating feedback loops that may sustain or support scaling up (Sutter Health Corporation, University of North Texas). Two categories of intervention components related to HIT offer promise in improving communications, including (1) portable transition of care or modified discharge documents,

and (2) web-enabled resources. Both leverage the scope and reach of interventions across geographic areas. For patients and families, intervention communications take place across multiple platforms (e.g., texts, telephone calls) and remote monitoring, alongside delivery of hard copy documents and in-person home visits. For intervention partners such as primary care providers or home health agencies, communication often relies on fax and telephone, with the lack of shared EHRs across institutions resulting in duplicate recordkeeping and difficulty leveraging newer, more cost-efficient technologies.

Patient and Caregiver Engagement. All 23 interventions include patient engagement or provision of caregiver supports, typically delivered in-person and often combined with telephone support. Approaches include chronic disease self-management, advance care planning, independent living workshops and peer coaching, and, most common across the cohort, teaching of patients or family caregivers how to participate directly in care or in managing the care process. For Medicare beneficiaries, engagement is usually conducted by licensed clinicians, often working with a social worker or nurse practitioner. Coaching about medication management is often, but not always, tasked to a clinical pharmacist. Interventions supported by Medicaid are more likely to employ non-licensed staff as educators, for example, community health workers and peer health educators. Many awardees have noted that engagement tasks have been more labor intensive and time-consuming, over many months, than originally anticipated.

To date, awardees have realized varying degrees of success in maintaining fidelity to their intervention models; in general, awardees have shown great agility in adapting their programs in the face of unanticipated hurdles, making course corrections midstream to better achieve their program objectives. Adaptations that preserve core elements (e.g., services delivered, intended outcomes) are common and often necessary following a program's launch, for example, in response to changes in health care markets (Developmental Disabilities Health Services, University of New Mexico), labor market shortages (University of North Texas) or post-launch feedback about the need for greater skill and knowledge among staff (Palliative Care Consultants of Santa Barbara, Providence Portland Medical Center), to resolve difficulties in communicating with partners, or to better monitor implementation. Awardees differ markedly in their respective capacities to monitor their interventions, to learn from monitoring, and to make changes to intervention tasks in response to feedback from monitoring. Larger organizational capacity or size does not necessarily confer an advantage in self-monitoring, as larger organizations may face administrative and logistic challenges not encountered by smaller, more nimble awardees.

Program Effectiveness

Ten awardees show decreases in hospitalizations, readmissions, or emergency department (ED) visits, with four showing statistically significant decreases for one or more of these core measures specified by CMMI. Eight awardees show decreases in cost of care, with four awardees showing statistically significant savings. In addition, supplemental measures for awardees are reported as data permits. We calculate timely follow-up by practitioners for patients following hospital discharge for awardees with care transitions interventions[2] and, if the number of observations is sufficient, ambulatory care sensitive (ACS) hospital admissions for awardees with interventions addressing primary and continuing care in the

[2] We define timely practitioner visits as follow-up occurring within 7 days and 30 days of discharge from the hospital.

community. Six awardees show improvements in the supplemental measures of quality of care, with four showing statistically significant improvements.

Preliminary findings on program effectiveness for CHRPT innovations, based on claims-based analyses, hold promise. We see early evidence of reduced utilization and potential cost savings for approximately one-third of the awardee interventions. Overall trends also suggest awardee programs have had meaningful impacts on the quality of care. In addition, analyses of survey and qualitative data from site visits and focus groups offer initial findings of increased timeliness of services delivery, improved patient and caregiver satisfaction, and a deepened, more comprehensive commitment to patient safety. Several emerging themes may have implications for successful programs, including the value of targeting interventions to the population most likely to benefit. Awardees that are able to more narrowly define the kinds of patients to be served are more likely to have evidence of effectiveness. The time frame also appears to make a difference in what we see with respect to program effectiveness. For many awardees, we see significant impacts at 30 days, six months, or one year post-intervention or program enrollment, but these findings are no longer evident at the two-year mark. Some of these short-term gains may justify the cost of the program, given the added quality of care, but these decisions ultimately lie in the hands of payers, increasingly charged with providing holistic care to populations of medically complex individuals.

NORC findings to date are not conclusive, as they are based on incomplete claims data (through December 31, 2014, for Medicare and earlier in time for Medicaid), and we currently lack comparators for some awardees and interventions. Further limits on generalizability reflect the small analytic sample sizes for some awardees and discrepancies between the descriptive characteristics of the analytic sample (e.g., demographics) and those self-reported by the awardee for all participants served.

For our third and final annual report, we plan to complete the analysis and presentation of relevant survey data gathered by NORC and by awardees, integrate qualitative findings from coded primary data more fully with claims-based findings, and conduct additional claims-based analyses for the full period of each awardee's period of performance. Results for the periods of awardees' no-cost extension periods will be presented in a separate addendum to the final report. We will also explore subgroups using categorical variables from awardee data, to focus on the effect of dosage on participant experience, which will ultimately allow us to identify "what works for whom" in the CHRPT portfolio.

Workforce Development

CHRPT awardees endeavor to increase the overall performance of their workforce through new and enhanced staff roles, retention initiatives, and training, with the ultimate goals of improving care quality and lowering the cost of care. Most awardees reviewed, and often changed, the roles and workflow of existing staff, as well as incorporating new, typically non-clinical, staff or specialists to care teams. Many awardees sought to hire mid-career or senior staff with experience across a number of care settings; this experience is often credited as fundamental to successful implementation. Internal hiring has been significant, especially when an awardee has been preparing for an initial project launch or when rolling out multiple sites. Training of intervention staff must have the right content, be targeted to the appropriate staff members, effectively inculcate new behaviors, knowledge, skills, and attitudes supportive of the innovation, and reinforce patient and family empowerment. Many awardees modified

their training approaches over the course of implementation, moving from more formal, didactic instruction toward more experiential approaches.

Staffing. Awardee self-reported data (through March 31, 2015) suggest that, with launch of the HCIA-funded project, program leadership have taken on new and more complex tasks related to managing the workforce. While 11 awardees report 20 or fewer individual staff, eight awardees have between 20 and 80 full- or part-time staff, and four awardees between 80 and 150 staff. Most report 20 or fewer full-time staff. The professional backgrounds of staff, roles, and scopes of practice vary across the portfolio. Almost all awardees employ advanced practice nurses or RNs, and the single largest staff category for the cohort consists of licensed clinical staff that are not independent clinical practitioners. Nearly one-third of awardees employ community health workers and/or patient navigators, part of the second largest staff category across the cohort, that of non-clinical staff. Awardees share the challenge of recruiting and retaining experienced, well-matched staff, given the relatively short timeframe (3 years) of initial HCIA funding, and also the shortages and frequent turnover in health care and home care labor markets. Awardees modify existing models of inter-professional teamwork, in some cases staffing a common set of tasks in different ways and in others, creating teams that bring together health care staff with those from social service agencies or the independent living rights community.

Training. Awardees are markedly diverse in the scope and intensity of training to support implementation, from interventions that rely on experiential training (e.g. shadowing, preceptorships or mentoring) for a small core staff to two interventions (California Long-Term Care Education Center, University of Arkansas for the Medical Sciences) that prepare the direct care workforce to participate more effectively in their clients' health care. Nine awardees report training over 500 staff to date. The remaining twelve interventions are either single-site interventions that train between 30 and 70 staff each or multiple-site interventions that train smaller numbers at each site. Among the 11 awardees that include competency-based learning (e.g., testing mastery of skills and knowledge), the frequency and intensity of training varies considerably. Across the portfolio, training content builds on three shared content areas: care coordination, participant and caregiver engagement, and building primary care capacity to serve medically complex and high-risk patients. Trainees in general have had positive experiences with HCIA-funded training. They report increased knowledge and skills in communication, self-confidence, and awareness of perspectives outside of the trainee's own professional background. Staff also report positive changes related to provider roles, the use of new techniques (often described as a challenge), improved attitudes toward team care, and empowerment to act. These changes accrue benefits to the awardee and innovation in terms of more confident staff and participants, and better integrated staff and services both inside and outside of clinical settings.

NORC's third annual report will consider the implications of these newly modified staff roles and training for the health care and home care workforce more broadly.

Context, Sustainability, Replicability and Scaling

Organizational capacity, combined with a favorable financing environment, is positively associated with sustainability and program growth. While HCIA funding nurtures new staffing and services delivery arrangements and insulates these innovations from the constraints of the larger regulatory and market

environments, the end of HCIA funding presses awardees to integrate their innovative practices, in some way, into "business as usual" policies and practices.

Exogenous Contextual Factors. Several Affordable Care Act (ACA) financing and delivery system initiatives launched concurrently with the Health Care Innovation Awards, including the Medicare-Medicaid Financial Alignment Initiative (FAI), State Innovation Model (SIM) Awards, and Accountable Care Organization (ACO) payment options, have affected the implementation of HCIA interventions and the state policy and marketplace environments within which the interventions operate. For awardees whose interventions target Medicaid beneficiaries, state policies regarding Medicaid benefits, professional credentialing requirements, and organizational structure are particularly important for the successful implementation of the HCIA initiatives. Notably, the growth of enrollees in states with Medicaid expansions consequent to ACA was more rapid than anticipated, providing awardees with new clientele and unexpected challenges in meeting their needs.

Other environmental factors also affect the success of these innovative programs. Stakeholders and partners in HCIA projects provide political, intellectual, and material support that is essential for getting interventions off the ground and for longer term success. For awardees serving populations disadvantaged economically and those with psychiatric or substance use disorders or functional disabilities, the availability of the supports and resources within the community, from voluntary organizations as well as publicly provided, are key to successfully addressing the needs of patients.

Endogenous Contextual Factors. Characteristics of the organization sponsoring an HCIA initiative also help to determine its performance. Organizations that can internalize savings or reap other benefits resulting from their innovations involving non-traditional staffing or service delivery approaches are better able to sustain their efforts than those that do not have such internal capacity. Leadership with a vision of the way forward to achieve high-value care must be provided both at the level of the innovation project and by the host organization(s) to accomplish and sustain change. Initiatives as diverse as those in the CHRPT portfolio may require and benefit from different leadership qualities. Finally, an organizational culture that fosters critical self-awareness among staff with respect to performance, and one that welcomes contributions to improving performance by staff at every level, helps providers achieve and sustain reforms in clinical practice and service delivery.

Sustainability, Replicability, and Scalability. Overall, 22 of 23 awardees report planning to sustain either part or all of their intervention after the initial period of HCIA funding. Of these, 13 received no-cost extensions from CMMI, either for specific intervention components or for the intervention as a whole, for a specified period of months. Factors influencing sustainability include public policy and regulatory environment, funding stability, partnerships and community supports, and organizational capacity, leadership, and culture.

Federal and state regulations can provide impetus for innovation; if not enforced or given priority, the impact of such environmental factors is lessened. The federal Hospital Readmissions Reduction Program and state certification requirements for home health workers are two such influences, the former on hospital-based transitions programs, and the latter on programs that train personal care aides (California Long-Term Care Education Center, University of Arkansas for Medical Sciences).

However, the single most important factor related to sustainability is that of payer arrangements. The difficulties faced by awardees in replacing HCIA funding that supports staff and services reflect the challenge of operating in a largely fee-for-service Medicare environment that is in transition to varied value-based purchasing arrangements (some of which are CMMI demonstrations at present) and, with respect to Medicaid, within dynamic and sometimes uncertain state programmatic frameworks. Widespread and ongoing reforms of state Medicaid programs, spurred by federal eligibility expansions and waivers, particularly the Financial Alignment Initiative that integrates Medicare and Medicaid benefits and payments, have created short term uncertainties and delays in awardees' plans for sustaining and scaling their innovations (California Long-Term Care Education Center, Community Care of North Carolina, Developmental Disabilities Health Services, LifeLong Medical Care, University Emergency Medical Services, University of New Mexico, University of Rhode Island).

Strategic community and national partners for the HCIA initiatives can help awardees sustain their work after the end of HCIA funding. Because of the acuity, complexity, and frequent social disadvantage of the populations served by the HRCPT portfolio of awardees, community-based programs and resources are needed in conjunction with the HCIA-supported innovations to serve medically at-risk populations well.

Organizations with extensive internal management and capital resources to operate complex interventions in changing, uncertain, or provisional financing environments have a great advantage in sustaining or scaling their HCIA-supported initiatives. Programs with multiple sites that can delegate oversight to local managers or partners are more likely to cultivate local ownership of the program and commitment to sustaining the intervention (Beth Israel Deaconess Medical Center, Community Care of North Carolina, Pittsburgh Regional Health Initiative, Sutter Health Corporation, University of Iowa, University of North Texas Health Science Center). Staffing and training are a critical part of both successful delegation and organizational capacity more generally, with a key indicator of sustainability related to an awardee's ability to recruit and retain the right staff for their respective interventions. Hiring and maintaining an appropriate mix of staff also involves attention to interdisciplinary teamwork, which is central to many interventions and often involves changing traditional roles and approaches to organizing work. More generally, CHRPT portfolio awardees are challenged to create systemic cultural change and receptivity within their host organizations and among intervention partners.

There is much overlap in the contextual factors that support sustainability, replicability, and scaling, for example, as is seen with interventions that expand on an evidence-based pilot (Developmental Disabilities Health Services, Johns Hopkins University School of Nursing, St Francis Healthcare Foundation, Sutter Health Corporation, University of Texas Health Science Center at Houston). Contextual factors that promote or hinder sustainability often have similar effects on efforts to replicate or scale an intervention, for example, with the influence of public policy and regulatory requirements such as patient choice, which may hinder replication or scaling of interventions where continuity of warm handoffs among providers is central to innovation model fidelity (Sutter Health Corporation, University of North Texas Health Science Center). Funding stability with respect to Medicare and state Medicaid programs, including waivers and related payer reforms, can offer an opening for replicating and scaling, for example, with new capitation or risk-based contracting in the form of a Medicare Accountable Care Organization (Northland Medical Care) or a waiver for home- and community-based care (Johns Hopkins

University School of Nursing, South Carolina Research Foundation) or case management (University Emergency Medical Services, University of New Mexico, University of Rhode Island). Funding opportunities strengthen prospective partnerships that are integral to replicating and scalability.

Groups of Special Interest: Pediatric, Rural and Behavioral Health. For awardees serving high-risk children, sustainability and scaling rely on securing Medicaid support, engaging stakeholders among providers and community programs, cultivating inter-professional teams, and engaging parent caregivers. Rural programs face labor market shortages and find partnerships with stakeholders important to their viability. Sustainability and scaling for innovations that include a behavioral health component are critically dependent on the ability of the organizations to hire and retain trained, skilled, and motivated staff, and to access appropriate addiction and psychiatric services, as well as cultivation of community supports for their clients.

Introduction and Methods

This report is the second annual report to be produced by NORC as part of its evaluation of 23 of the first-round Health Care Innovation Award (HCIA 1) interventions, conducted under contract with the Center for Medicare & Medicaid Innovation (CMMI). The 23 awardees are in the Complex/High-Risk Patient Targeting (CHRPT) portfolio, serving patients who live in the community and who have multiple, medically complex conditions that put them at higher than average risk for hospitalization or re-hospitalization.[3] This report offers a public update to our evaluation following its second year (September 2014 through August 2015). Here we present selected analytic findings and briefly discuss plans for the remainder of the evaluation. We summarize findings across the group of 23 awardees and include feedback for each awardee in the awardee-specific analyses of program effectiveness, included in Appendix F.

Our evaluation, like those of the other front-line evaluators for HCIA 1, is guided by an overarching evaluation research design developed during the first year of the HCIA funding period, including a logic model, conceptual framework, core research questions, and methodological approach. This general evaluation framework allows for some customization that reflects the particular characteristics of each of the seven groups of awardees. Consistency in approach and shared learning across evaluators is supported by an Evaluators' Collaborative and by the concurrent development of a meta-evaluation. The HCIA 1 evaluations share the same set of broad objectives, namely, to document:

- implementation effectiveness and efficiency;
- program effectiveness, for health outcomes, cost, quality, and equity;
- effectiveness of workforce training programs;
- impact on priority populations, for outcomes and cost; and
- contextual factors that affect performance, both endogenous (awardee) and exogenous (environment).

Key outcomes of interest (e.g., core measures) across all 107 awardees include utilization (all-cause hospital admissions, hospital readmissions, emergency department visits), total cost of care, and patient health and well-being.

This report includes an overview of the complex high-risk awardee portfolio; cross-awardee findings related to implementation effectiveness, program effectiveness, workforce development, sustainability, and scalability; and supporting appendices that include 23 awardee-specific chapters where findings and progress on data collection and analyses are reported. See Exhibit 1.1 for a list of the 23 awardees in the Complex/High-Risk Patient Targeting portfolio.

[3] In addition to the 23 awardees assigned to the CHRPT evaluation, the remaining awardees are grouped in evaluation portfolios of disease-specific interventions, behavioral health, primary care redesign, community-based interventions, hospital-based interventions, and medication management and shared decision making.

Exhibit 1.1: The Complex/High-Risk Patient Targeting Awardees

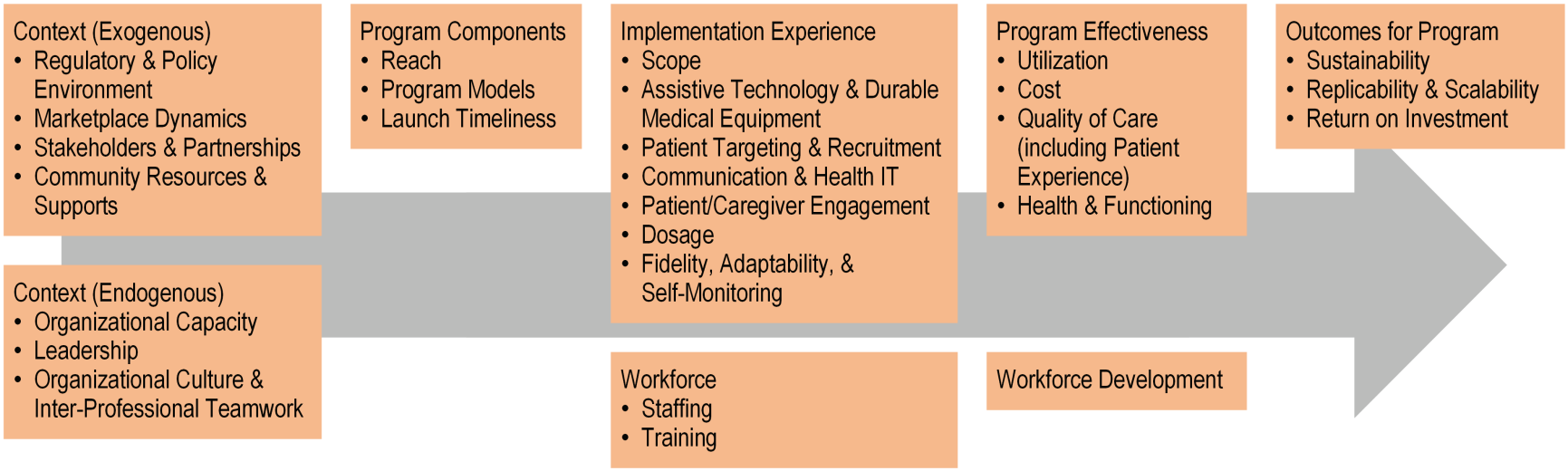
Awardee	Abbreviation	Intervention
Beth Israel Deaconess Medical Center	BIDMC	Post-Acute Care Transitions
California Long-Term Care Education Center	CLTCEC	Care Team Integration of the Home-Based Workforce
Community Care of North Carolina	CCNC	Child Health Accountable Care Collaborative
Courage Kenny Rehabilitation Institute	CKRI	Advanced Primary Care Clinic
Developmental Disabilities Health Services	DDHS	Developmental Disabilities Health Home
Johns Hopkins University	J-CHiP	Community Health Partnership
Johns Hopkins University School of Nursing	JHU SON	Project Community Aging in Place, Advancing Better Living for Elders
LifeLong Medical Care	LifeLong	LifeLong Comprehensive Care Initiative
Northland Healthcare Alliance	Northland	Northland Care Coordination for Seniors
Palliative Care Consultants of Santa Barbara	PCCSB	Doctors Assisting Seniors at Home
Pittsburgh Regional Health Initiative	PRHI	Primary Care Resource Center
Providence Portland Medical Center	PPMC	Tri-County Health Commons
South Carolina Research Foundation	SCRF	HOMECARE+
St. Francis Healthcare Foundation of Hawaii	St. Francis	Home Outreach Program and E-Health (H.O.P.E.)
Sutter Health Corporation	Sutter Health	Advanced Illness Management
University Emergency Medical Services	UEMS	Better Health through Social and Health Care Linkages Beyond the Emergency Department
University of Arkansas for Medical Sciences, Schmieding Center	UAMS	Cost-Effective Delivery of Enhanced Home Caregiver Training
University of Iowa Hospitals and Clinics	U Iowa	Transitional Care Teams
University of New Mexico Health Sciences Center	U New Mexico	Extension for Community Healthcare Outcomes (ECHO) Care
University of North Texas Health Science Center	U North Texas	Brookdale Senior Living Transitions of Care
University of Rhode Island	URI	Living RIte Centers
University of Texas Health Sciences Center	UT Houston	High-Risk Children's Clinic
Vanderbilt University Medical Center	VUMC	Reducing Hospitalizations in Medicare Beneficiaries

Evaluation Design

As described in our previous reports, NORC's evaluation of the CHRPT awardees takes a mixed methods approach, using a multiple-phase case-study design where each of the 23 awardees is one case. The phases include (1) evaluability determination, (2) concurrent primary (qualitative and survey) and secondary (claims, electronic health records, administrative records) data collection and analysis, and (3) mixed qualitative and quantitative data analysis and interpretation. To date, we have prepared seven of nine quarterly reports—offering rapid-cycle feedback on an ongoing basis—and plan one final, summative report, in addition to our first annual report (2014) and this report.[4] Exhibit 1.2 depicts the conceptual framework for our evaluation.

[4] NORC has submitted quarterly reports for use by CMMI and the awardees, as follows: First (March 2014), Second (June 2014), Third (September 2014), Fourth (December 2014), Fifth (March 2015), Sixth (June 2015), and Seventh (September 2015). The remaining quarterly reports are scheduled to be submitted in December 2015 (Eighth) and March 2016 (Ninth).

Exhibit 1.2: Conceptual Framework, Evaluation of the CHRPT Portfolio of HCIA Awardees



Previous NORC reports to CMMI presented updates on our 23 awardees. This report presents an analysis of significant issues raised in the evaluation to date, across the awardees as a cohort. In addition, Appendix F of this report presents a more in-depth set of quantitative findings (e.g., greater number of awardees for which data are available for analysis, greater numbers of observations available in claims-based data, and additional outcome measures beyond the core measures) as well as survey findings where available.

Quantitative Methods

Our quantitative evaluation assesses the impact of awardee programs on measures of health, utilization, health care cost, and quality of care. In general, our approach involves linking identifying information for program enrollees to their Medicare and/or Medicaid claims using information provided by the awardees (a finder file). This information allows us to compare the experiences of beneficiaries and comparison groups both before (pre) and after (post) implementation of the HCIA-supported intervention, enabling evaluation of HCIA interventions contrasted with usual care.

In cases where we have both pre- and post-intervention data for both groups, we use a difference-in-differences design. If we lack baseline data for the awardee's treatment or comparison group, we use a longitudinal (time series) two-sample design for comparison. Finally, in the absence of comparison group data, we use a post-intervention longitudinal design for the awardee's treatment group to assess whether longer duration of enrollment in the program is associated with better outcomes, costs, utilization, and quality of care.

Intervention Type

We identify two broad groups of interventions among the awardees based on the setting and goals of the intervention: post-acute care interventions, which seven awardees operate, and ambulatory care programs, conducted by 18 awardees. Three awardees, J-CHiP, PPMC, and St. Francis, conduct both kinds of programs. Post-acute care (PAC) interventions focus on improving patient outcomes during or immediately after a discrete event, such as hospitalization. In general, participants in PAC interventions are enrolled at admission or discharge from an inpatient stay and receive the intervention for a defined period of time after hospital discharge. Ambulatory care interventions identify and engage participants in the outpatient setting and generally focus on improving health, increasing quality of care, while reducing spending for patients with chronic conditions living in the community. To analyze data for these two types of interventions we use slightly different methods and summarize key differences in Exhibit 1.3.[5]

[5] Additional details about design considerations for each intervention type are provided in Appendix C.

Exhibit 1.3: Methodological Overview by Awardee Intervention Type

	Post-Acute Care (PAC) Interventions	Ambulatory Care Interventions
Intervention Overview	Participant selection event based, focused on transition from inpatient to post-acute settings for patients with the targeted conditions	Participant selection from the community, often a convenience sample of patients with the targeted condition seen in an outpatient clinic
Design	Serial cross-section—comparing treatment provider to other providers pre- and post-intervention period	Longitudinal cohort—comparing treatment cohort and comparison group at two (or more) points in time
Analytic Method	Difference-in-differences	Difference-in-differences
Unit of Analysis	Patient-episode	Patient
Internal Comparison (pre-period)	Patient-episodes at awardee facilities before start of intervention	Patients before enrollment in the intervention
External Comparison (pre and post-periods)	Patient-episodes from similar facilities from time periods before and after the intervention was implemented	Patients selected from a comparable geographic region or provider organization followed for 2 – 4 years to mirror time period of awardee intervention

Data Sources

Exhibit 1.4 summarizes the evaluation design and data source available in this report. For 18 of the 23 awardees in our portfolio, we assess program effectiveness using either Medicare claims (13 awardees) or Medicaid encounter/claims data (six awardees). For four awardees for which we do not now have claims data, we assess program effectiveness using survey data.

Exhibit 1.4: Evaluation Design for Awardees

Awardee	Intervention Type	Data Source for Second Annual Report	External Comparison Group
BIDMC	PAC	Medicare	■
CCNC	Ambulatory care	Survey	
CKRI	Ambulatory care	Survey	
CLTCEC	Ambulatory care	Medicaid	■
DDHS	Ambulatory care	Medicare	
J-CHiP	PAC/Ambulatory	Medicare	■
JHU SON	Ambulatory care	Medicare	
LifeLong	Ambulatory care	Medicaid	■
Northland	Ambulatory care	Medicare	■
PCCSB	Ambulatory care	Medicare	■
PPMC	Ambulatory care	Medicaid	■
PRHI	PAC	Medicare	■
SCRF	Ambulatory care	Medicare	
St. Francis	PAC/Ambulatory	Medicare	
Sutter Health §	Ambulatory care	Medicare	■
U New Mexico	Ambulatory care	Survey	
U North Texas	Ambulatory care	Medicare	■
UT Houston §	Ambulatory care	Medicaid	■
UAMS §§	Workforce analysis only	Survey	■
UEMS	Ambulatory care	Medicaid	■
U Iowa	PAC	Medicare	■
URI	Ambulatory care	Medicaid	■
VUMC	PAC	Medicare	■

NOTE: For all awardees but three of those with external comparison groups, we use difference-in-differences analyses to assess program effectiveness. §We use time-series analyses to assess program effectiveness for two awardees where we lack pre-intervention data for the treatment and comparison groups. §§ We assess program effectiveness for this awardee comparing post-intervention survey data across the treatment and comparison groups.

Measures of Program Effectiveness

Our summative analysis of program effectiveness estimates the impact of the interventions on measures of health, quality of care, utilization, and cost.

For awardees with Medicare or Medicaid claims data, we assess impact on five core measures.[6] These core measures, which CMMI uses to assess the performance of a broad range of health care innovations, are:

- all-cause hospitalizations per 1,000 patients
- 30-day readmissions per 1,000 patients
- ambulatory-care-sensitive (ACS) hospitalizations per 1,000 patients
- emergency department (ED) visits per 1,000 patients
- total cost of care per patient

For the awardees for which we only have survey data, we were not always able to duplicate the core measures. Instead we used indicators of health, quality of care, utilization, and cost that are present in the survey dataset and that we hypothesize are likely to be affected by the awardee's intervention. Exhibit 1.5 summarizes the measures used to evaluate each of the awardee programs.

[6] For details on the specifications for the core measures, please refer to Appendix C.

Exhibit 1.5: Measures of Program Effectiveness for Each Awardee

Awardee	CMMI Core Measures					Primary Care Physician Follow-up Post Discharge	Survey Measures
	Hospitalizations	30-day Readmissions	ACS Hospitalizations	ED Visits	Total Cost of Care		
BIDMC	■	■		■	■	■	
CCNC							Improvements in missed school or work; training and workplace experience and satisfaction
CKRI							Behavior or care coordination improvements
CLTCEC	■			■			Experience and impact of training
DDHS	■	■	■	■	■		Juniper Pediatric Asthma Caregivers Quality of Life Questionnaire
J-CHiP	■	■	■	■	■	■	
JHU SON	■	■	■	■	■		Self-reported exercise, healthy diet, and sleep
LifeLong	■			■			
Northland	■	■	■	■	■		
PCCSB	■	■	■	■	■		
PPMC	■			■	■		Training and workplace experience and satisfaction
PRHI	■	■	■	■	■		Training and workplace experience and satisfaction
SCRF	■	■	■	■	■		
St. Francis	■	■	■	■	■		
Sutter Health	■	■	■	■	■		Training and workplace experience and satisfaction
U New Mexico							Training and workplace experience and satisfaction
U North Texas	■	■	■	■	■		
UT Houston	■			■	■		
UAMS							Experience and impact of training; client functional status
UEMS	■			■	■	■	
UIHC	■	■		■	■	■	
URI §	■		■	■	■		
VUMC	■	■	■	■	■	■	

NOTE: § For URI, we report avoidable hospitalizations as behavioral health hospitalization days.

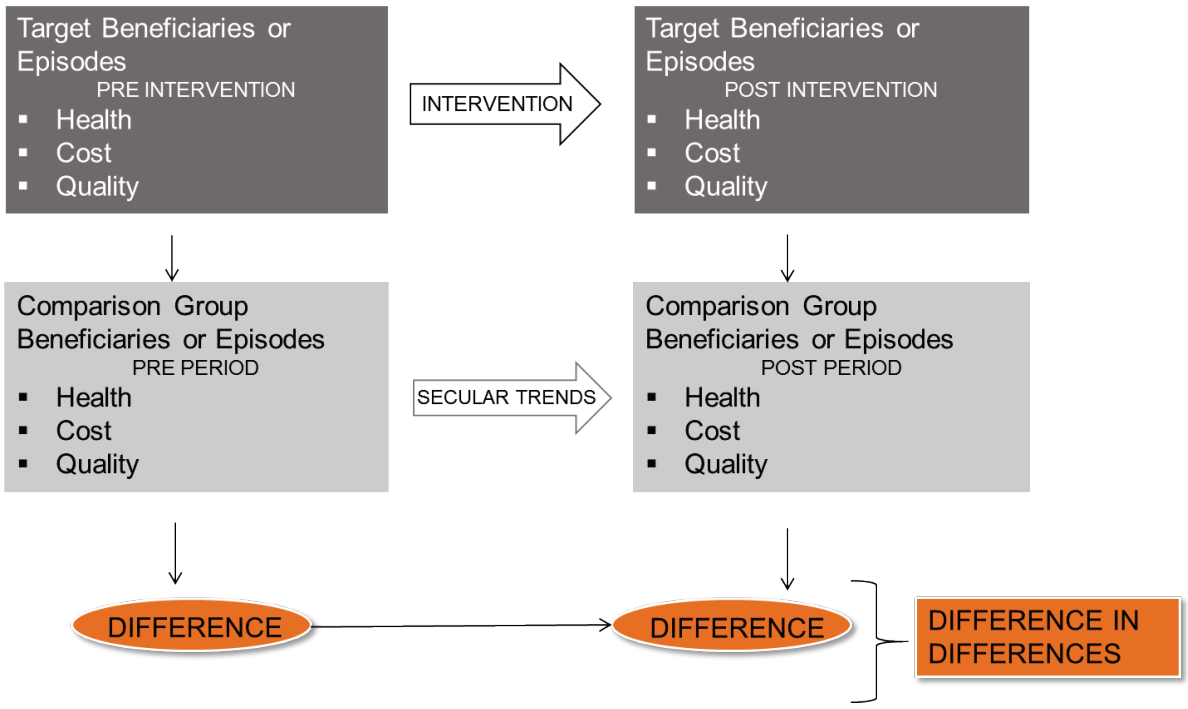
Analytic Methods

For awardees with an external comparison group, and data on both pre- and post- intervention periods, we use difference-in-differences (DID) analyses to assess program effectiveness. This design allows us to estimate the average treatment effect for the program while limiting the influence of selection bias (by using treatment and comparison groups pre- and post-intervention) and secular trends (by analyzing differences between two groups over the same period). Implementing a DID design requires both a comparison group and pre-/post-intervention data, which we do not have all for all awardees at this time (see Exhibit 1.4). We use time-series analysis for those awardees where DID analyses is not feasible.

For the thirteen awardees that have both a comparison group and pre-/post-intervention data, we use DID methods to analyze program effectiveness. The DID is the difference in average outcome between the intervention and a comparison group *after* implementation of intervention minus the difference in average outcome between the intervention and a comparison group *before* implementation of the intervention.

This specification allows us to study the impact of the awardees' programs compared to either similar provider organizations (for post-acute interventions), or similar patients receiving usual source of care (for ambulatory interventions). Exhibit 1.6 depicts the DID method for both post-acute and ambulatory awardees. We incorporate propensity score methods[7] within the DID framework to minimize observed differences between the treatment and comparison groups.

Exhibit 1.6: Difference-in-Differences Design for Post-Acute and Ambulatory Interventions



For two awardees with comparison groups and no pre-intervention data, we assess program effectiveness using time-series analyses that compares the average difference between the awardee and the comparison group after enrollment in the intervention. For three awardees without comparison groups and pre/post intervention data, we use time-series analyses to assess program effectiveness, and measure the intervention's impact as the average difference in the outcome of interest in the periods *before* and *after* the intervention. If a significant change is seen in outcomes, the intervention is assumed to cause the change. However, in the absence of a comparison group, we cannot say whether the changes in outcomes are caused by other non-intervention factors at play during the intervention period. We acknowledge this limitation of time-series analyses in assessing program effectiveness, and caveat our findings for awardees without comparison groups. The specifications of our time-series models are detailed in Appendix C.

[7] Propensity score approaches are described in detail in Appendix C.

Qualitative Methods

NORC's qualitative evaluation uses document review, interviews, and site visits including focus groups and workplace observations to gather primary data complementary to the quantitative analyses of claims, survey, and other awardee program data. We analyze text-based data to identify and articulate themes that:

- inform our understanding of contextual factors that influence each awardee's implementation experience,
- refine existing variables and suggest new variables for use in the quantitative analyses, and
- offer insight into how and why interventions succeed or fall short of their goals, and their prospects for scalability.

As outlined in our first annual report, during the initial year of this evaluation, we conducted an evaluability assessment and began our first round of phone interviews with awardees and project officers as well as multiday site visits. In this second year we conducted additional site visits and phone interviews with awardees to gather more data. Details follow.

For administrative purposes, NORC organized its qualitative team into three groups, assigning each group the lead for a cohort of awardees. The three cohorts group awardees with post-hospitalization, care coordination interventions; awardees with interventions related to long-term services and supports or in-home care; and awardees with specialized interventions that combine elements of post-acute care, long-term services and supports, and/or community-based interventions.[8] We assigned staff members to each cohort who serve as the point of contact for awardees and who plan and conduct site visits. Exhibit 1.7 lists the awardees by cohort.

Exhibit 1.7: Administrative Cohorts for NORC Evaluation

Post-Hospitalization/ Care Coordination	Long-Term Services and Supports/ In-Home Care	Specialized Interventions
■ Beth Israel Deaconess Medical Center ■ Johns Hopkins University ■ Pittsburgh Regional Health Initiative ■ Providence Portland Medical Center ■ St Francis Healthcare Foundation of Hawaii ■ University of Iowa ■ University of Texas Health Science at Houston ■ Vanderbilt University Medical Center	■ California Long-Term Care Education Center ■ Courage Kenny Rehabilitation Institute ■ Developmental Disabilities Health Services ■ Johns Hopkins School of Nursing ■ Northland Healthcare Alliance ■ South Carolina Research Foundation ■ University of Arkansas for Medical Sciences ■ University of Rhode Island	■ LifeLong Medical Care ■ Community Care of North Carolina ■ Palliative Care Consultants of Santa Barbara ■ Sutter Health Corporation ■ University Emergency Medical Services ■ University of New Mexico ■ University of North Texas

[8] Assignment to a cohort reflects information given to NORC at the start of the evaluation, from the HCIA evaluation design and the awardees' original application. Clarification of scope and approach, including subsequent formal changes to scope of work, may not be accurately captured by these initial assignments.

Site Visits

Site visits are a key source of primary qualitative data, supplementing program document review and the series of telephone interviews that NORC has conducted with CMMI project officers and all of the awardees. NORC conducted one site visit with each awardee during 2014 and a follow-up site visit with eight awardees in spring 2015 (February through May). Those awardees not selected for a second site visit were interviewed by phone to gather information about the third year of implementation and their plans following the end of HCIA funding. An awardee was considered for a second site visit if the intervention had been launched relatively late in the award period; if the awardee's intervention was being implemented in multiple locations and NORC's first site visit did not permit a balanced sampling of these locations (for example, observing locations with different strengths and challenges); or, if an awardee's intervention was so complex that the initial site visit did not afford adequate time to observe all key components of the intervention or to meet with all key stakeholders and partners. A second site visit was also indicated when an awardee seemed to be exceeding expectations in terms of intervention performance. Final decisions about second site visits were made by the NORC team in late 2014, in consultation with CMMI and the awardees. Appendix Exhibit D.1 displays decision criteria for the second round of site visits and provides further detail on NORC's methods.

As with those conducted in the first round, the follow-up site visits were an opportunity to gather a variety of qualitative data, through semi-structured interviews and observations as well as focus groups and less formal group discussions. Decisions about the locations to be visited (for awardees with multiple sites), the use of focus groups versus group discussions or interviews, the identity and roles of interview respondents, and the nature of any direct observation were specific for each awardee. Qualitative data collection incorporate a number of strategies to address threats to credibility, including how a respondent may react personally (reactivity) to an evaluation team member; biases that evaluators bring to the task of observing and recording data; and biases that respondents express verbally or behaviorally. These strategies include the triangulation of observations from multiple sources (including quantitative data and findings), the use of frequent team debriefings to confirm or challenge observations made by an individual evaluation team member, debriefs with awardee leadership at the end of the visit to present initial impressions and ask questions to confirm understanding, and the creation of an audit trail of memoranda and documentation internal to the evaluation. In addition, site visit interviews and focus groups were recorded (with appropriate consent given by group participants and interview respondents) to supplement and verify written notes.

Data Procedures

Data gathered through interviews, site visit observations, and focus groups have been systematically coded using a codebook based on the HCIA meta-evaluation conceptual framework that captured the major components of the evaluation of complex/high-risk patient targeting awardees related to four code families: program, process, environment, and workforce. Observations related to effectiveness are clustered under the process family, given that outcome measures are being assessed through the quantitative arm of the evaluation. Coded data were then used to identify themes within administrative cohorts and across all 23 awardees to better understand potential strengths and challenges among awardees and focus our analysis on evaluation domains. Appendix D provides additional information on

the coding framework and process. These theme-based analyses have guided the writing of the cross-awardee chapters in this report and form the basis for answering the evaluation's set of core research questions in the final evaluation report.

Survey Methods

As described in earlier reports to CMMI, we are collecting and analyzing primary data from two general types of surveys, one focusing on consumer and caregiver experience with awardee interventions and the other on the preparatory and work experiences of awardees' trainees and staff in redesigned care delivery systems. See Appendix D for more information about our approach to survey data collection, which varies by awardee. As of August 31, 2015, considerable progress has been made fielding and analyzing NORC's directly administered surveys. Data collection is complete for all but two of these surveys. Appendix F presents the results of our analysis of several workforce surveys and a few consumer surveys completed within the past three months. Analysis of the data collected for the remaining surveys continues. We anticipate that data collection for PCCSB, our last consumer survey to be fielded, will end by mid-September. We have also received survey data from several awardees with whom NORC coordinated survey efforts, and we expect to receive awardee survey data sets through mid-2016 for some awardees that have received no-cost extensions of their period of performance. Please see Exhibit D.6 for the updated schedule for survey administration, data sharing, and analysis.

As much as possible, survey questions are replicated across awardees, whether in NORC stand-alone or coordinated surveys, to optimize cross-awardee comparisons. NORC will continue to work with awardees over the coming months to obtain consumer and workforce survey data that have been collected by awardees, where appropriate.

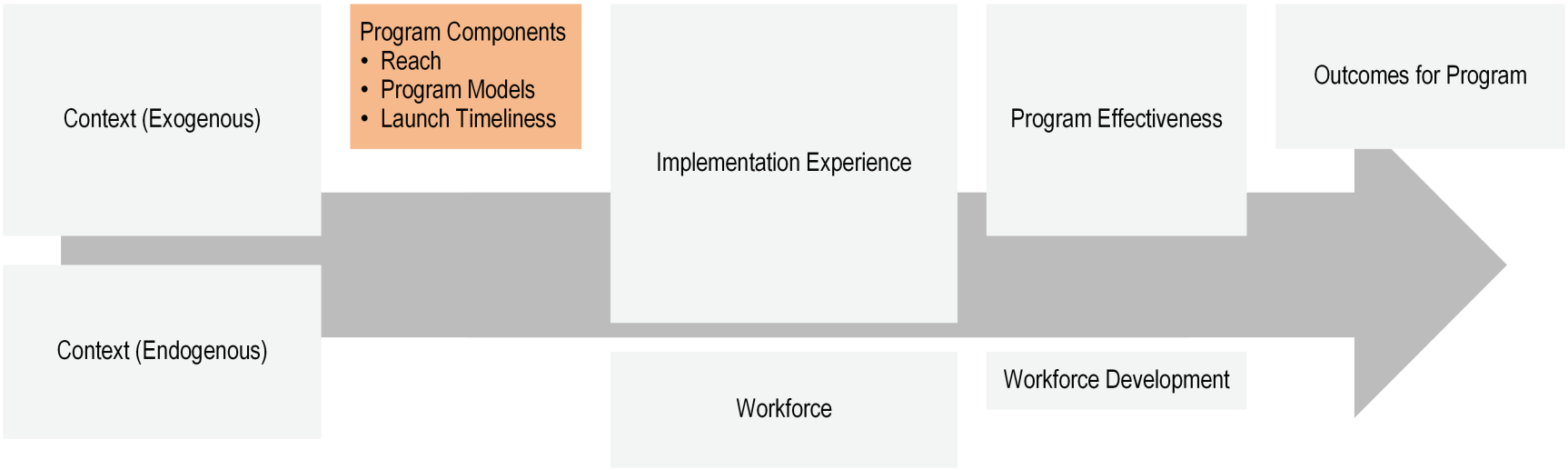
Overview of the Complex/High-Risk Patient Targeting Portfolio

Overview

Under the auspices of the Patient Protection and Affordable Care Act, HCIA funding is awarded competitively to support pilot testing of new models, replication of established models, and scaling of tested interventions, all intended to improve quality of care and health while lowering health care costs. The 23 awardees in NORC's Complex/High-Risk Patient Targeting (CHRPT) portfolio serve patients living with multiple complex conditions (MCC) who live in the community and are at high risk for hospitalization or entry to skilled nursing facilities (SNF). Awardees take a variety of approaches to reform, including care coordination, redesign of clinical workflow or processes, delivery of specialty care integrated with primary care and dissemination of clinical practice guidelines, patient and caregiver engagement, and training for clinical and non-clinical staff in new and expanded roles. In addition to diversity of approach, there is considerable variation among awardees in the maturity of the intervention being tested. These range from freshly conceived pilots to scaling of evidence-based innovations across health care systems or states.

This chapter introduces the CHRPT portfolio, considering the reach of each awardee's interventions in terms of target population and pace of implementation, the range of intervention objectives in addition to the triple aim, and the intervention program models and drivers for change. It sets the stage for the chapters that follow, which will address the key evaluation domains of implementation effectiveness, program effectiveness, workforce development, and the role of contextual factors in sustaining, replicating, and scaling the interventions. Exhibit 2.1 depicts the domains where findings are offered in this chapter, in the context of the evaluation's conceptual framework.

Exhibit 2.1: Overview of the CHRPT Portfolio: A Visual Guide



Reach: Populations Served by the CHRPT Awardees

CHRPT awardees serve a variety of patient populations who are at high risk for hospitalization, re-hospitalization, emergency department (ED) visits, or nursing home stays. Participants served usually live within a particular geographic area (both rural and urban) specified by the awardee but the size of the area varies considerably. Most awardees work with populations over the age of 65 years but some target younger adults, while a few exclusively serve high-risk children. Some of the awardees focus on addressing the needs of historically disadvantaged or underserved communities, which is reflected in the racial and ethnic composition of their program.

Targeted Population Groups

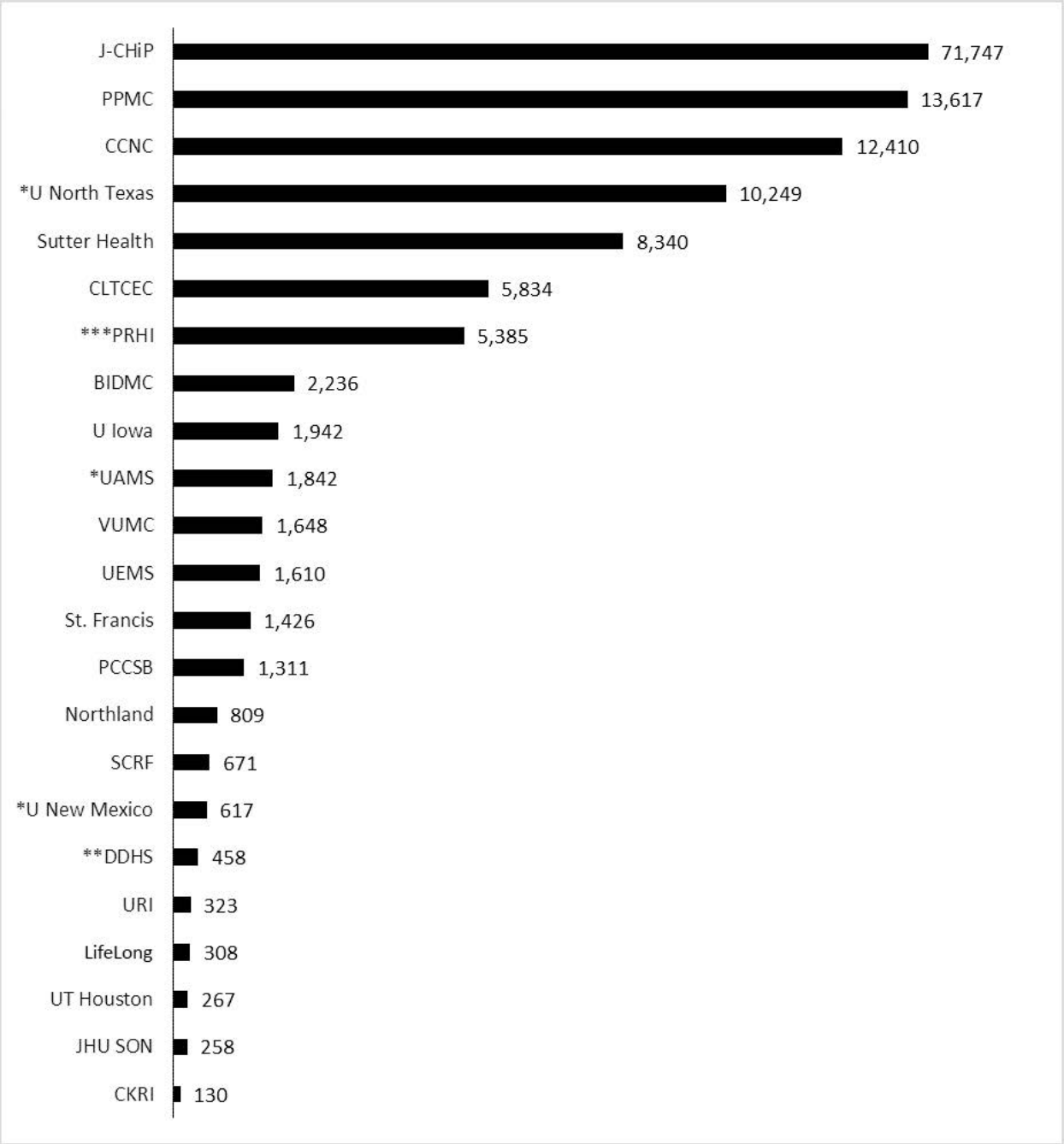
Within the broad category of complex/high-risk patients, awardee target populations include:

- Frail elders or those with multiple chronic conditions (18 awardees)
- Adults (18 years of age and older) living with a physically disabling condition or those with multiple chronic conditions (12 awardees)
- Adults (18 years of age and older) living with behavioral problems, mental illness, addiction, or cognitive impairment (nine awardees)
- Adults with late-stage disease (six awardees)
- Adults (18 years of age and older) living with an intellectual or developmental disability (three awardees)
- Children with complex health conditions (two awardees).

Awardees may serve patients or clients in addition to those they target or may have revised the scope of their patient targeting. Appendix Exhibit E.1 lists target populations reported by each awardee.

Awardees also vary widely in scale. While most have enrolled a few hundred people, several larger interventions have enrolled thousands. Exhibit 2.2 shows the number of unique participants served by CHRPT awardees.

Exhibit 2.2: Numbers of Unique Patients Served, Cumulative Since Program Launch, as of HCIA Reporting Quarter 11[9]



NOTES: Bars are proportional to size of participant group reported, except for J-CHiP, which is truncated due to the large size of the participant group, compared with the other CHRPT awardees.**Cumulative data are not available for this awardee; data reported are only for HCIA Reporting Quarter 11. ***Cumulative data are available and are reported only through HCIA Reporting Quarter 10.

[9] These data are self-reported by awardees as cumulative totals of participants served, updated on a quarterly basis and presented within HCIA quarterly reports prepared by the HCIA implementation contractor, Lewin Associates.

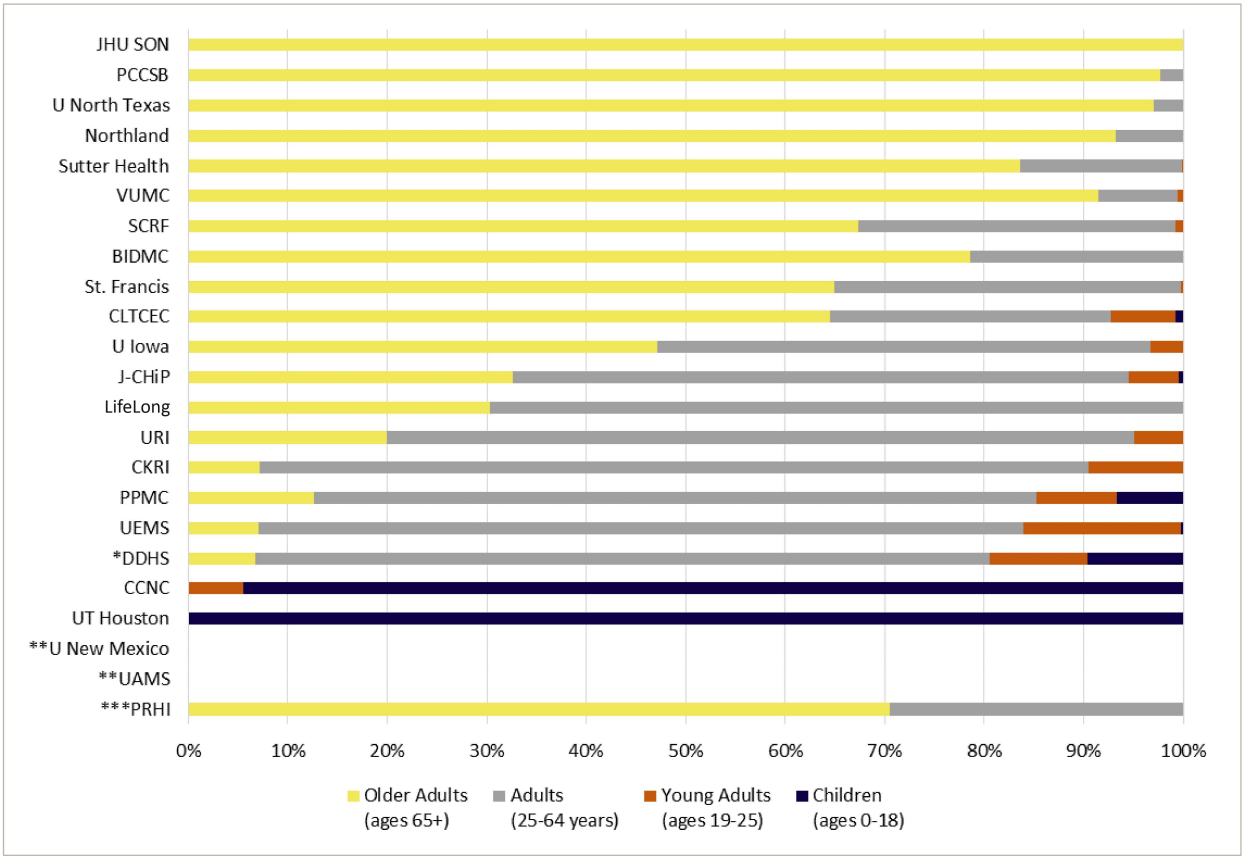
Demographics

The most recent quarterly report submitted by the awardees to CMMI offers a snapshot of the age and racial and ethnic identity of patients; unless otherwise noted, these data reflect patients or participants for the eleventh HCIA reporting quarter (the period from January 1 through March 31, 2015).[10] This snapshot gives a sense of which populations are being served, how an intervention may be tailored to target a subgroup of the general population, and the potential impact of a particular intervention on health disparities. Information is not available from these reports on levels of educational attainment or household income that, together with race or ethnicity, comprise a measure of socioeconomic status that can be an important predictor of access to care and of health disparities. These observations raise questions for NORC to explore in its evaluation over the coming year.

Age. The concentration and distribution of patients by age cohort likely reflects both the health-related and functional challenges at different stages in life and the ways in which needs for health care or long-term service and supports change over the course of life. As of Q11, 54 percent of participants were 65 years of age or older, 32 percent were adults ages 25 to 64 years, 3 percent were adults ages 19 to 24 years, and 11 percent were children no older than 18 years. Exhibit 2.3 shows the age distribution of participants by awardee.

[10] HCIA reporting periods cover the following time periods: Q1 (July 1 – September 30, 2012), Q2 (October 1 – December 31, 2012), Q3 (January 1 – March 31, 2013), Q4 (April 1 – June 30, 2013), Q5 (July 1 – September 30, 2013), Q6 (October 1 – December 31, 2013), Q7 (January 1 – March 31, 2014), Q8 (April 1 – June 30, 2014), Q9 (July 1 – September 30, 2014), Q10 (October 1 – December 31, 2014), Q11 (January 1 – March 31, 2015), and Q12 (April 1 – June 30, 2015).

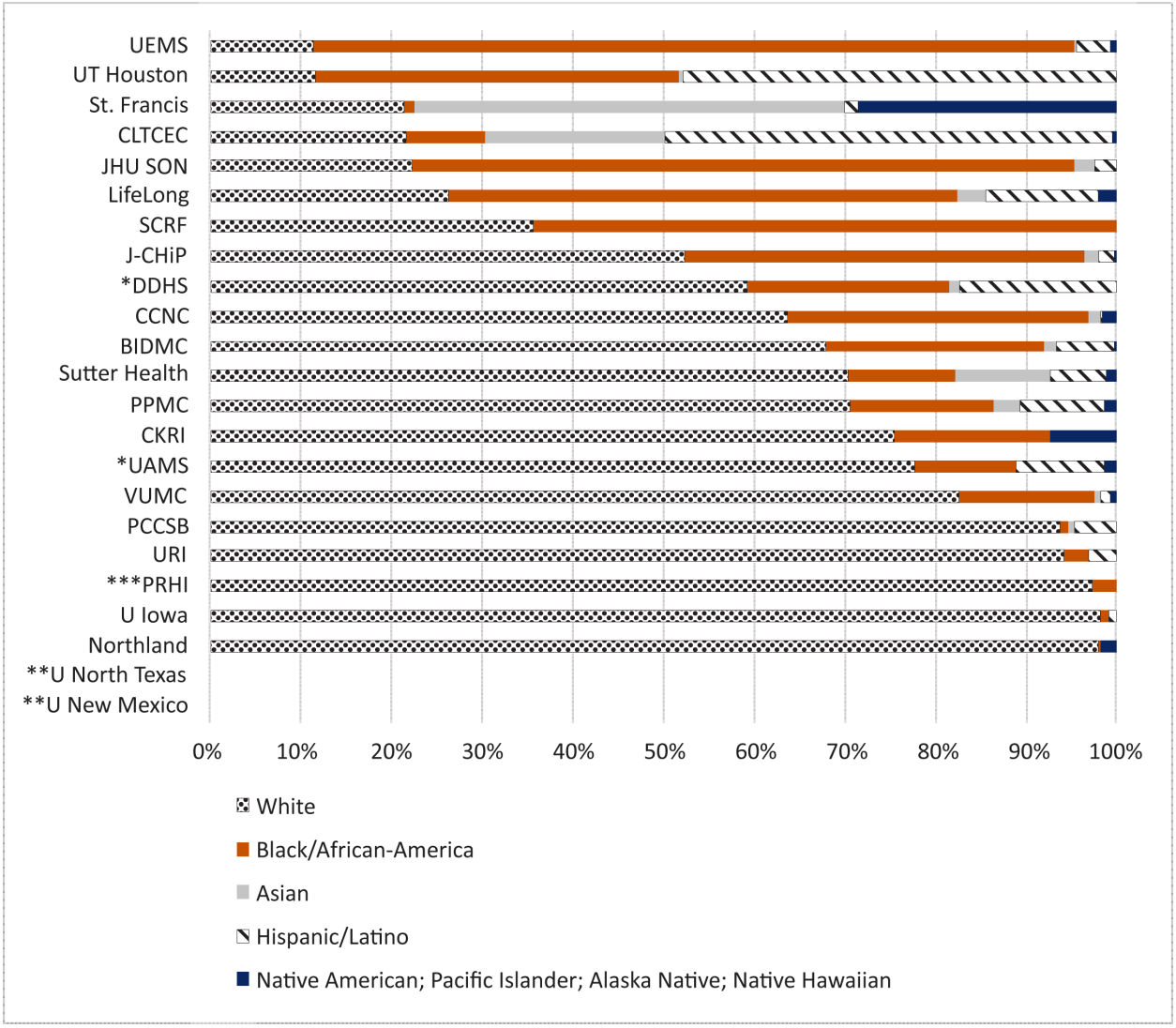
Exhibit 2.3: Age Range of Patients Served, by Awardee



NOTES: Data reported in Exhibit are those self-reported by awardees to CMMI, for participants served during the time period January 1 through March 31, 2015. *The awardee's self-report notes that participants are served indirectly by services supported with HCIA funding. **Awardees did not report data on participant age cohorts. ***The most recent self-reported data for this awardee is for the time period October 1 through December 31, 2014.

Racial and Ethnic Identity. While none of the 23 awardees explicitly target members of a racial or ethnic group, patterns of service are likely to reflect the catchment areas and historical relationships of the awardees. Exhibit 2.4 suggests that the majority of participants are white (59 percent) or African American (28 percent). Only 8 percent of participants are Hispanic/Latino and 5 percent are Asian. The remaining 1 percent of participants are identified as Native American, Pacific Islander, Alaska Native, or Native Hawaiian.

Exhibit 2.4: Racial and Ethnic Identity of Patients Served, by Awardee



NOTES: Data reported are those self-reported by awardees to CMMI, for participants served during the time period January 1 through March 31, 2015. *The awardee reports data for trainees rather than for clients served by the trainees. **Awardees do not report racial/ethnic identity for participants. ***The most recent self-reported data for this awardee is for the time period October 1 through December 31, 2014.

Priority Populations

Our evaluation considers the impact of innovation on groups that have historically been underserved (e.g., racial and ethnic minorities, persons living with a disabling condition), to understand whether and how CHRPT interventions address disparities in access to care. In addition, the impact of CHRPT interventions on groups other than Medicare and Medicaid beneficiaries (e.g., commercially insured, uninsured) is of interest. While we are not yet able to answer these questions about impact until our claims- and survey-based analyses are complete (for NORC's third annual report), and until we receive the awardee's final self-reported data (through the end of no-cost extensions), information reported by the awardees as of the Q11 HCIA reporting period (through March 31, 2015) gives us a snapshot of trends to inform our hypotheses about priority populations.

Services Delivered to Members of Racial and Ethnic Minority Groups.[11]

- For 13 awardees, over 50 percent of the participants served to date (March 31, 2015) have been White; five of these awardees are among the largest in terms of the number of participants, each serving over 5,000 people (CCNC, J-CHiP, PRHI, PPMC, and Sutter Health). Of this group of awardees, five have served groups reported to be at least 90 percent White (Northland, PCCSB, PRHI, U Iowa, and URI).
- Seven awardees have served populations that are at least 40 percent African American or Black (CCNC, J-CHiP, JHUSON, LifeLong, SCRF, UEMS, UT Houston); two of these awardees have reported serving over 5,000 people (CCNC, J-CHiP).
- Three awardees have served populations to date that are at least 10 percent Latino or Hispanic (CLTCEC's trainees, DDHS, LifeLong).

Services Delivered to Persons Living with a Disabling Condition.

- Five awardees report targeting or providing services to persons living with a disability. Of these, three serve persons with physical or functional disabilities (CKRI, JHU SON, UT Houston) and three identify their target population as those living with developmental or intellectual disabilities (DDHS, URI, UT Houston).
- While the awardee self-reported data on targeting goals offers one way to identify services delivered to persons living with a disability, data from program documents and NORC's site visits indicates that other awardees are serving persons living with a physical or functional disability, including those awardees that serve frail, homebound beneficiaries (e.g., PCCSB, Sutter Health).

Services Delivered to Persons Other Than Medicare and Medicaid Beneficiaries.

Reliability of self-reported data, as well as generalizability of data from one of 12 awardee quarterly reports, is unclear. For example, U Iowa reports that the payer source for 65 percent of those served is unknown, and two awardees have not reported payer sources for the clients served by their participants (UAMS) or for their participants (U North Texas). While our plans for analysis include devising strategies to confirm payer source, the Q11 HCIA self-reported data offer trends to consider, including the following:

- For ten awardees, all participants in the most recent quarter for which data are available (January 1 through March 31, 2015) are Medicare, Medicaid, or dually eligible beneficiaries.
- Other payer sources noted by awardees include commercial or private coverage (10 awardees), TriCare or Armed Forces (eight awardees), and Veterans' Administration (six awardees).
- Four awardees report having served persons who are uninsured.

[11] As noted in a previous section, there is no awardee self-reported data on racial and ethnic identify of participants in the Q11 reports for CLTCEC clients, UAMS, U New Mexico, and U North Texas.

Program Models

All 23 CHRPT awardees have adopted, modified, or combined a number of evidence-based models to guide their interventions. The recent Institute of Medicine report, *Living Well with Chronic Illness: A Call for Public Health Action* (2012) offers an evidence-based typology of program models for health care delivered to persons with multiple chronic conditions.[12] See Appendix Table E.2 for a synopsis of definitions for each of the models relevant to the CHRPT portfolio.

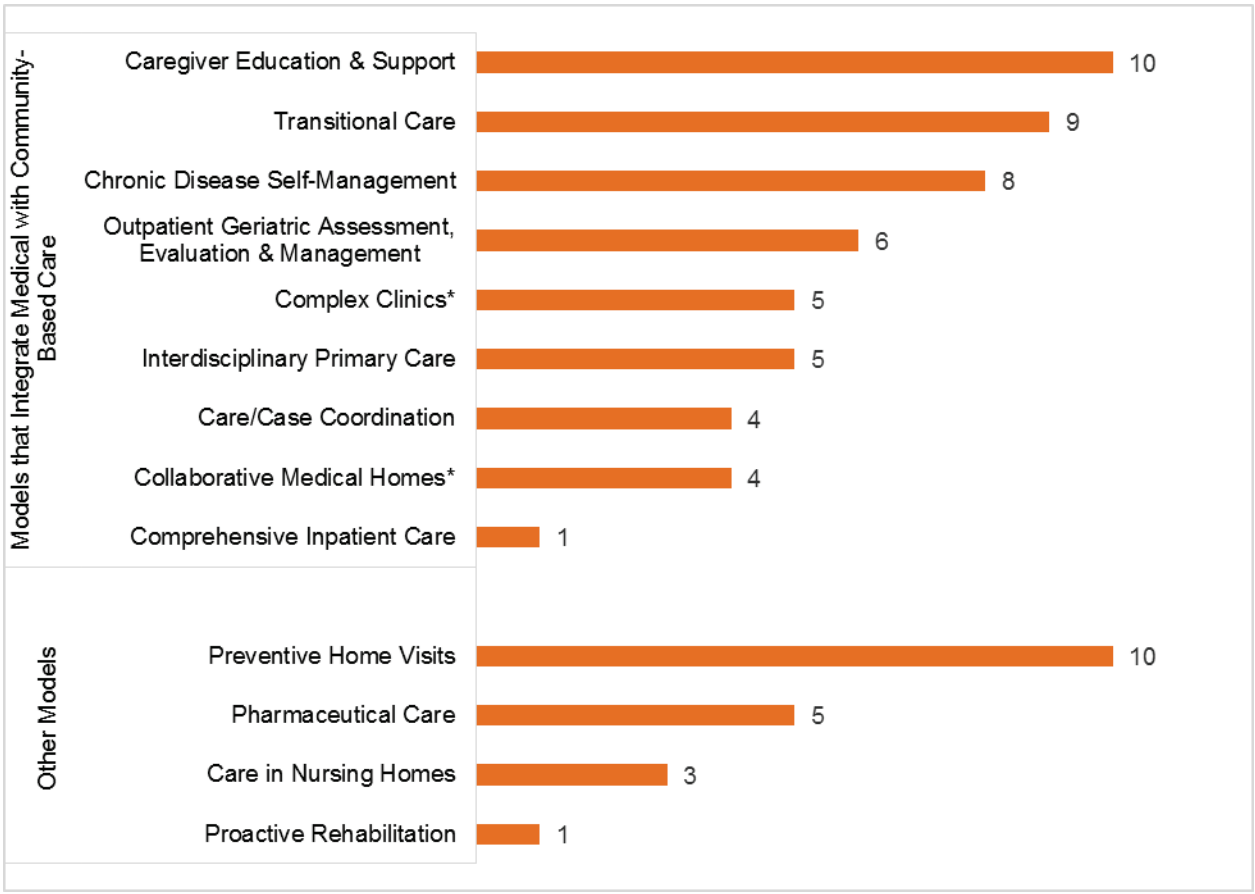
Using the IOM typology, we identify nine models used by CHRPT awardees to deliver comprehensive care that integrate health care with community supports and four models that deliver comprehensive care without a clear link to community agencies or programs; some awardees employ practices from more than one model.

- Among programs that link comprehensive care with community supports, the most common model used is that of caregiver education and supports (10 awardees), followed by transitional (post-acute) care (nine awardees), and chronic disease self-management (eight awardees).
- Care coordination and the collaborative medical home (a patient-centered medical home that partners with a community agency) are often folded into multidimensional programs such as integrated primary care; only four awardees use either care coordination or a collaborative medical home without other program components.
- Nine awardees incorporate preventive home visits into their interventions and five include pharmaceutical management.
- Both awardees with pediatric innovations rely on complex care clinics, together with caregiver education and support. CCNC also offers a collaborative medical home, reflecting its statewide reach through partnerships with community agencies and health care networks.
- The most common intervention for our rural awardees is caregiver education and support, used by three of the six awardees.
- Eight awardees offer behavioral health services; interdisciplinary primary care teams and preventive home visits are common approaches, sometimes combined in one innovation program.

See Exhibit 2.5 for a depiction of the number of awardees that are using one or more aspects of each program; Appendix Table E.3 gives a detailed listing of awardee and breakdown of model by category of awardee (rural, pediatric, and behavioral health component).

[12] Institute of Medicine. Living Well With Chronic Illness: A Call for Public Health Action (Washington, DC: The National Academies Press, 2012).

Exhibit 2.5: Program Models, Complex/High Risk Patient Targeting Portfolio



NOTE: *Models for which the IOM report does not identify peer-reviewed evidence of a statistically significant improvement in quality of life or functional autonomy, for literature reviewed through June 2011.

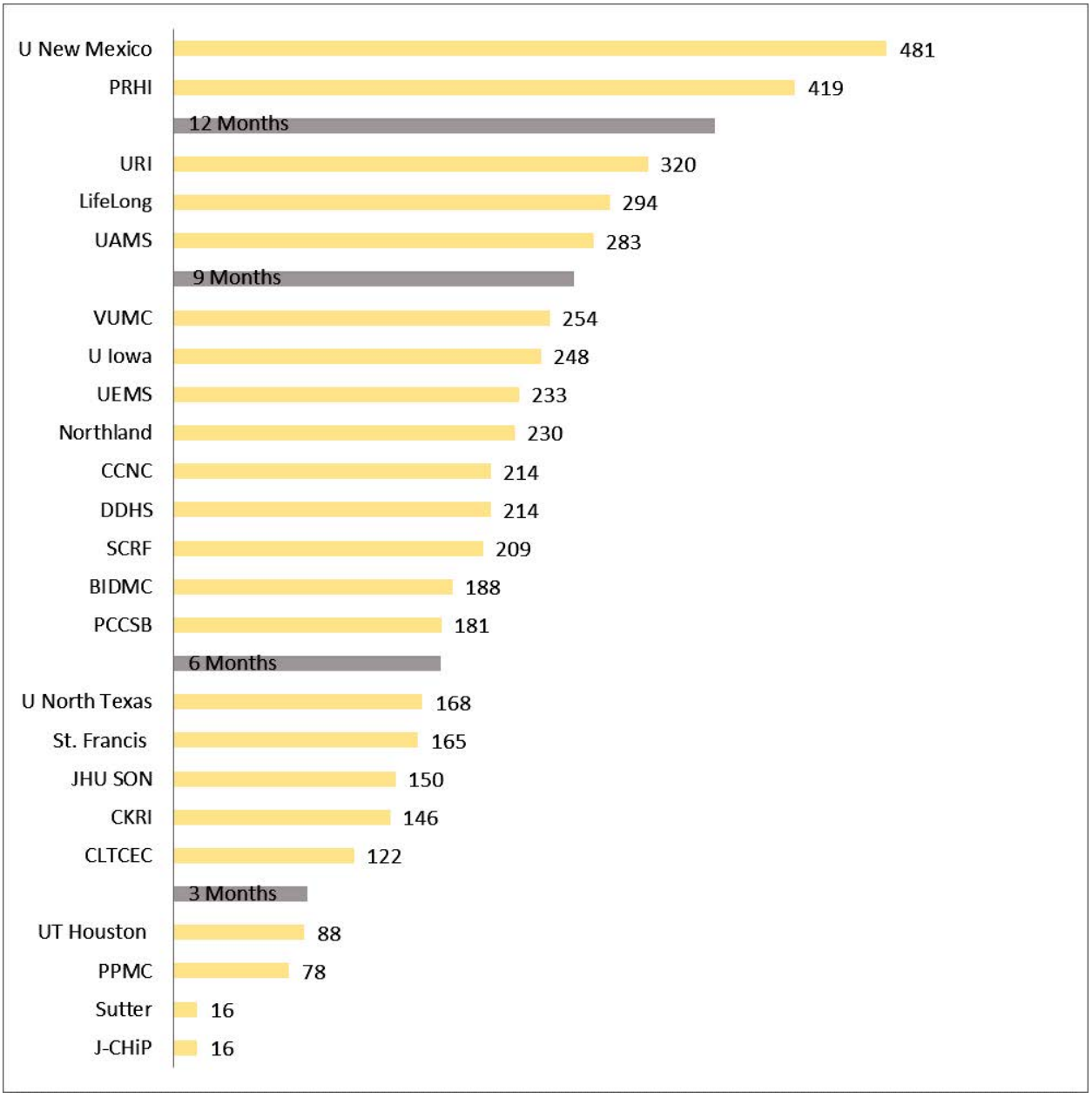
Timeliness of Launch Process

Another aspect of reach considered as part of our evaluation design is that of each awardee's implementation schedule and the timeliness of launch. Awardees typically encountered administrative delays, including time spent in negotiations with CMMI over the scope of work. Those that piloted a new program faced additional tasks, compared with awardees that scaled up an existing model that they piloted before the three-year HCIA funding period. Eleven of the CHRPT awardees scaled up a program that each had successfully piloted prior to the HCIA award (CLTCEC, CKRI, DDHS, JHUSON, Northland, PRHI, St Francis, Sutter Health, U North Texas, UT Houston, VUMC).

With few exceptions, considerable time elapsed between award date and program launch for CHRTP awardees. See Exhibit 2.6 for a summary of launch timing. About half of all awardees were delivering services within 6 months. The preparatory period ranged from just over two months (78 days) to well over 1 year (481 days). Most awardees took somewhere between 5-7 months (9 awardees) and 8-10 months (6 awardees) to launch their programs, and even longer to reach full implementation. Several awardees (J-CHiP, Sutter, Providence Portland, and UT Houston) were able to launch at least some interventions relatively quickly after award date. While the details of their experiences are different, all four of these

programs had already implemented some version of their intervention by the time they received their award, thus having some staff on board and making it easier to recruit participants. On the other end of the spectrum, those awardees that took over a year to launch either built a program from the ground up including staffing, training, and finding clinical homes for their outpatient intensivist teams (U New Mexico) or faced problems beyond their control, like identifying new partner hospitals to participate after previously committed partners were no longer able (PHRI).

Exhibit 2.6: Number of Days, From Award to Launch, by Awardee



NOTE: These data are based on awardee self-reported dates for award of HCIA funding and that for the first enrollment or services delivery. Grey bars indicate standard periods of time, as labeled, for use in comparing relative delays reported by awardees.

Summary

In this chapter we have updated the picture of the CHRPT awardees that we introduced in our previous annual report, characterizing the populations targeted and served by the awardees over much of the initial period of HCIA funding. We also consider the awardees' programs and interventions within the framework of the IOM's evidence-based typology of program models for care delivery for persons with multiple chronic conditions. Finally, as preface to the next chapter, which addresses the evaluation's findings to date on implementation effectiveness, we examine the post-award, pre-launch period during which awardees prepared to serve clients and patients.

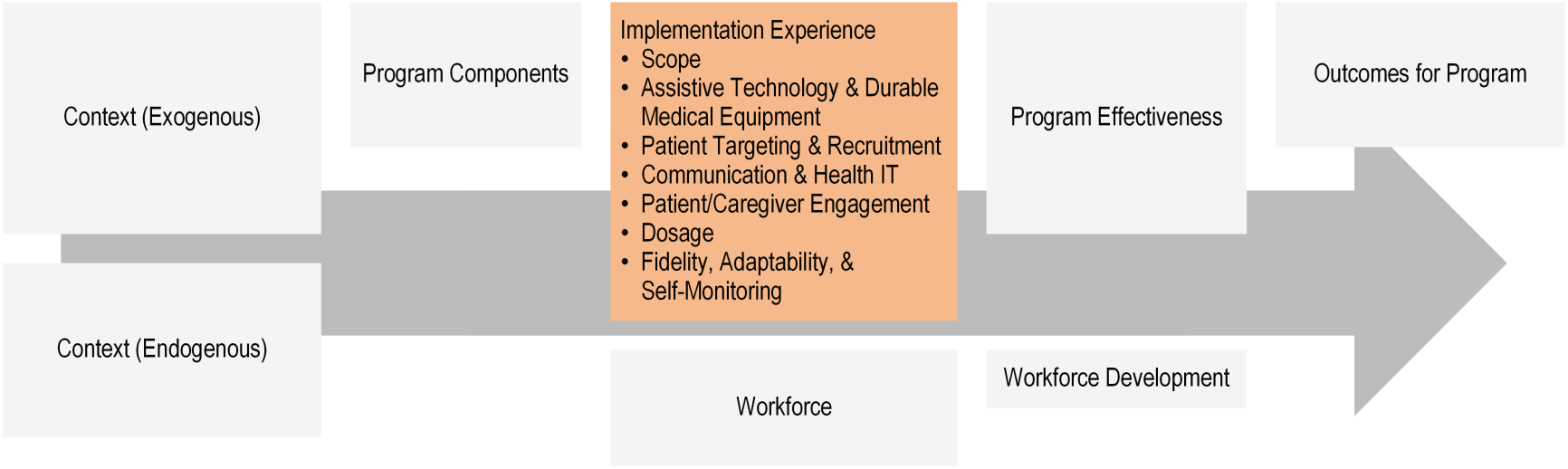
Implementation Effectiveness

Overview

How do CHRPT awardees deploy innovation models and practices to serve their target populations? In our first annual report (September 2014), we explored three shared and central aspects of the implementation process or experience across the CHRPT cohort: the recruitment of patients and their caregivers (one aspect of each intervention reach), communication and health information technology (which underpin and constrain efforts to coordinate care), and patient and caregiver engagement (a proposed driver of behavior change). Here we enrich our preliminary findings with new data and analyses to begin answering questions about effectiveness from a process perspective. This set of findings will become the basis for assessing implementation effectiveness in our third annual report (summer 2016).

This chapter is organized by evaluation domain. First, we describe the awardee interventions, comparing the categories of intervention tasks, settings, and relative complexity (e.g., geographic, organizational) across the portfolio, to characterize how innovation has been operationalized and to begin to understand the influence of context. We pay special attention to the role of assistive technology and durable medical technology (equipment), which are commonly a part of life outside of hospital settings for high-risk patients. Next, we revisit the three aspects of implementation discussed in our first annual report, taking a closer look at how awardees have tried to recruit patients and caregivers, foster communication among providers and between patients or caregivers and providers, and engage patients and/or caregivers in the interventions themselves. This review informs our assessment of promising examples and emerging trends. We include a brief discussion of the issue of dosage and the challenges of measuring or calibrating dosage. We also address programs' fidelity to the model that they initially proposed and the practices being tested (e.g., services delivered, populations served), as well as their ability to adapt to changing circumstances and unanticipated challenges, and to respond to the results of self-monitoring and internal evaluation data. Ongoing, midstream adaptability is at the heart of rapid cycle innovation –how successful have CHRPT awardees been at monitoring implementation and in learning from their own experiences? The chapter closes with a brief summary of findings and next steps. Throughout, we highlight observations related to rural setting, pediatric target populations, and interventions that address behavioral health. See Exhibit 3.1 for a visual guide to this chapter, based on an expanded conceptual framework for our evaluation.

Exhibit 3.1: Implementation Effectiveness: A Visual Guide



Intervention Scope

Tasks

The CHRPT portfolio awardees' interventions involve one or more of the following tasks:

- *Coordination and/or Delivery of Care*. All but two of the 23 awardees are involved in care coordination among providers, the exceptions being CLTCEC and UAMS, which train direct care workers. Four awardees add formal care management to care coordination (Northland, PPMC, Sutter Health, UT Houston). Ten awardees deliver health services as well as care coordination, using a Medical Homes approach, and 12 awardees include home visits.
- *Redesign of Workflow or Clinical Process*. Thirteen awardees focus on changing workflows, either at their own organization or that of one or more intervention partners, in order to achieve care coordination or the integration of new elements into primary care, including specialty care, participant engagement, long term services and supports, and community services and benefits that address the social determinants of health (e.g., transportation, housing, nutrition).
- *Developing Dedicated IT Tools*. Fourteen awardees have developed novel health IT infrastructures to support their HCIA-funded intervention, and five use telemedicine to deliver services to participants and caregivers (this does not include awardees that use remote video or telephone services indirectly, for example, U New Mexico's telementoring).
- *Engaging Participants and Caregivers*. The CHRPT portfolio features a robust commitment to patient engagement, made operational through patient navigation (17 awardees) and the use of patient decision supports and shared decision making (19 awardees) in such areas as development of care plans and hospital discharge summaries that reflect priorities expressed by participants or their caregivers.
- *Developing the Health and Home Care Workforce.* Training initiatives are another focal point for CHRPT awardees. Eleven include provider decision supports or clinical practice guidelines, and five awardees are wholly or significantly devoted to training of non-licensed caregivers or personal care aides.

See Appendix Exhibit E.4 for a summary of awardees by key intervention objectives and components.[13]

Setting

Awardees deliver services across one or more settings:

- Eleven interventions target participants who are being discharged from the hospital.
- Fourteen awardees operate in ambulatory care settings, including hospital outpatient and emergency departments, federally qualified health centers (FQHCs) and other clinics, and the offices of primary care providers. Awardees that serve patients and clients with behavioral health

[13] Definitions for the terms used to describe components are drawn from the RTI meta-evaluation's guide to domains and meta-domains (2013).

problems include at least one ambulatory care setting (CKRI, DDHS, J-CHiP, LifeLong, PPMC, U Iowa, U New Mexico, URI).

- Three awardees focus on patients who are in, or are being transferred to, skilled nursing (J-CHiP, U North Texas, VUMC).
- Sixteen interventions focus on community and home-based settings, including assisted living.

See Appendix Exhibit E.5 for a summary of intervention setting by awardee. Please note that our evaluation also categorizes awardees by setting (post-acute versus community-based), as summarized in Appendix Exhibit C.1) but according to a more narrow definition than practice setting; in our evaluation design, an intervention is defined as hospital-based when a hospitalization triggers enrollment.

Complexity

The complexity of a particular awardee, compared with the rest of the CHRPT portfolio, can reflect several considerations, including the number of distinct intervention arms or programs, its geographic spread, and the number of sites and oversight arrangements for multi-site awardees. The 23 HCIA programs range in size from fewer than 200 participants for highly targeted programs to tens of thousands of participants in a single metropolitan region. The programs are likewise diverse in terms of geographic spread, ranging from a small clinical staff serving a single community, to statewide interventions, to sites across several non-contiguous states.

- Five awardees have one site and a relatively compact geographic range or catchment area for their intervention (CKRI, JHU SON, PCCSB, UEMS, and UT Houston). All have relatively small numbers of dedicated staff and FTEs.
- Five awardees have more than one site or different intervention arms at different locations, within one large organization. Two of these awardees (J-CHiP and PPMC) have a relatively large and dedicated staff, many of whom are fulltime. The other three awardees (St. Francis, LifeLong, and U North Texas) use a relatively small core staff to field their interventions across multiple sites.
- For 11 awardees, implementing an intervention at multiple sites involves partnerships with outside organizations across service areas, ranging from one city, or multiple towns and counties, to states and regions. Most of these awardees report small to medium-sized dedicated staff, in terms of both person-counts and FTEs, while Sutter Health has a larger number of dedicated staff, with relatively greater proportions of staff working less than fulltime.
- Two of the awardees are implementing training programs for the direct care workforce, one with a relatively small core staff (UAMS) and the other with a large, mostly fulltime staff of instructors (CLTCEC).

See Appendix Exhibit E.6 for a summary of geographic spread and organizational complexity by awardee.

Assistive Technology, Durable Medical Technology (Equipment)

NORC's CHRPT evaluation includes questions specifically for our cohort, related to the use of assistive technology (AT) and/or durable medical equipment (DME) to serve persons living with multiple chronic conditions. Some AT may be reimbursable under Medicare or Medicaid as durable medical technology; the definition of AT emphasizes supporting improved functioning, including ADLs, for persons living with a disabling condition, while the definition of DME focuses on medically necessary equipment; the categories overlap.[14]

For many enrollees, health care and long-term services and supports, including AT and DME, are interdependent. Effective medical care is likely to require ongoing, reliable access to an insulin pump for a person living with diabetes, home oxygen for a COPD patient, or a nebulizer for a child with severe asthma. A certified nurse practitioner affiliated with CKRI summarizes the work of care coordinators in obtaining AT/DME, "I don't think we could do our jobs without them. It's night and day from when I started; we can offer our patients the resources they need." For complex, high-risk populations living at home, DME can be a matter of life and death; as one parent caregiver described her child's dependence,

> *"One time, I had a problem where the ventilator quit and I had to use a hand bag ventilator to keep her alive for the five hours it took the company to get there [and] fix it*." [UT Houston Parent Focus Group, 2014]

Broken, inappropriate, or unavailable DME throw care plans into disarray and destabilize a patient already at high-risk for rehospitalization. This can happen, for example, when shifts in Medicaid contracts mean a change in vendors. Care coordination and patient navigation can improve access to such tools, and the process of patient and caregiver engagement can strengthen the capacity of enrollees to advocate successfully for access to tools when needed and to use them appropriately.

Our preliminary findings from coded primary data include the following themes[15]:

Patient navigation and care coordination include facilitating the process of obtaining AT/DME. Support to participants and their caregivers ranges from following up with providers to ensure that technology has been prescribed, documentation and signed paperwork faxed to the vendor, and the request processed in a timely fashion (CCNC, CKRI, LifeLong, Sutter Health, UT Houston, U Iowa) to a partnership between an awardee (Northland) and an Interagency Program for Assistive Technology, which can provide technology at no cost. At least one awardee concludes that having clinicians, rather than non-clinical staff, navigate on behalf of participants for DME can be especially effective.

Home visits often include assessment of AT/DME needs. HCIA-funded staff involved in home visits (JHUSON, J-CHiP's skilled nursing and hospital arms, Northland, PCCSB, SCRF) include an environmental safety audit and assessment of technology needs that support the discharge of a participant

[14] Medicare covers DME when judged to be medically necessary; Medicaid coverage is more varied, by program and by state. Definitions of assistive technology at http://www.eldercare.gov/eldercare.net/public/resources/factsheets/assistive_technology.aspx, accessed 8/24/15. State Assistive Technology Programs, at http://www.resnaprojects.org/nattap/at/stateprograms.html, accessed 8/24/15.

[15] Using coded data, text search query "equipment," and review of PROCESS-OTHER codes (strengths, challenges).

from hospital or SNF to home or that enable participants to continue living at home, delaying entrance to a SNF. For example, Northland's care coordinators have arranged for purchase and installation of stairwell lifts, fall alert and safety equipment, such as flasher additions to smoke detectors and a doorbell for a client who is deaf, and J-CHiP integrates discussion of DME needs into discharge planning from SNFs as well as into multidisciplinary daily inpatient rounds.

Interventions include coaching for participants and caregivers about AT/DME needs and how to use AT/DME appropriately. A non-resident family member praised Northland for providing information about options for safety equipment to support a parent living independently with a back injury. Awardee staff facilitate self-advocacy; for example, the IHSS caregivers trained by CLTCEC learn to coach their patients to include AT/DME needs in the notes that they take with them to medical appointments. For parent caregivers of high-risk children, where DME is essential to living at home, CCNC staff at one site (Wake Med) remind parents to bring their child's equipment to clinic appointments, and UT Houston clinicians coach parents in the use of technology, so that a parent will

> *"not feel panic and fear when caring for [my daughter] at home. He [HRCC clinic director, Dr. Mosquera] walked me through adjusting the ventilator at home. During the weekends, normally we don't have a nurse during the night. If there's a fever or respiratory distress, I already know what Dr. M. will tell me to do, so I turn up the ventilator. They help us feel empowered."* [UT Houston Parent Focus Group, 2014]

Implementation Experience

In NORC's first annual report (2014), we identify three key aspects of implementation experience related to scope, regarding the recruitment of patients and caregivers, the centrality of efforts to strengthen communications (including the development and use of health IT), and the efficacy of participant and caregiver engagement, which is a shared driver across most of the interventions. The following sections review these three aspects in greater detail, presenting findings based on primary data collected and analyzed by NORC.

Patient Targeting and Recruitment

Identifying and targeting recruitment of participants in interventions designed for complex, high-risk patients is a critical early step in implementation. The ultimate success and sustainability of CHRPT awardees' programs hinges on their ability to recruit and serve participants for whom the intervention is most effective in changing the outcomes of disease processes for the better. In addition to reductions in inappropriate utilization and cost of care, improved outcomes include better patient and caregiver satisfaction and experience, and improved quality of life. Because awardees in the CHRPT portfolio share the objective of serving populations with multiple comorbidities, functional limitations, and difficult life circumstances, they are similarly concerned with identifying the "right" patients for their interventions as a matter of efficiency as well as effectiveness. HCIA programs with more than one intervention (J-CHiP, PPMC, St. Francis), can have several sets of criteria for identifying and modes for recruiting participants.

The following are observations and findings that are common across members of this evaluation portfolio.[16]

Effective targeting by level of patient risk requires access to person-level data for the population from which the program draws its participants, and the capacity to analyze results and modify recruitment criteria or the intervention accordingly. Nine awardees rely, or planned to rely, on Medicare or Medicaid utilization records obtained from a variety of sources: CMS, Medicare third-party administrators, state Medicaid agencies, or Medicaid managed care organizations (MCOs).[17] For some awardees (J-CHiP, LifeLong, PPMC, UT Houston), application of claims or utilization-based algorithms to identify high-risk prospective enrollees worked as planned, often because the holder of the data was an affiliate or partner of the awardee. In other instances (CCNC, CLTCEC, SCRF, St. Francis, U New Mexico), Medicaid or Medicare data were not immediately available, not refreshed, or not available at all. For example, CCNC launched a statewide care coordination program for medically complex children, planning to identify potential enrollees from state Medicaid records. Because of a change in the vendor that aggregated and processed Medicaid claims within North Carolina, the availability of this data was delayed for almost one year. CCNC developed a workaround in 2014, using hospital admission, discharge, and transfer (ADT) notifications, claims information collected from providers, and provider referrals to identify eligible children. Similarly, CLTCEC's program was initially designed to recruit high-risk Medicaid clients with personal care attendants (PCAs) funded by the state In Home Services and Supports (IHSS) program using state, county, or MCO information to identify candidates for the paired client–PCA training program. As the state determined that Medicaid information could not be shared with this awardee, and the MCOs in two of the three counties with training programs decided that they could not share enrollee information with CLTCEC either, the awardee had to redesign its trainee recruitment strategy altogether, using door-to-door canvassing to identify and recruit eligible client-PCA pairs for the classes.

Several awardees adjusted their targeting criteria and recruitment strategies as they learned more about their participants and were able to identify those for whom it was most effective. Both UEMS and PPMC modified their targeting and recruitment for their emergency department (ED) interventions. Initially, UEMS community health workers (CHWs) recruited patients for their ED deterrence and patient navigation program within the ED, as patients waited to be seen. This strategy proved to be ineffective, because the CHWs and the intervention itself were not well-integrated with the ED staff and processes. After assessing their early experience, UEMS developed referral relationships with primary care clinics and outpatient clinics affiliated with the Erie County Medical Center and contacted clients in community settings rather than exclusively in the ED. PPMC likewise modified their deployment of ED Guides and the patients in EDs who were targeted for patient navigation and referrals to primary care clinics after the program examined the utilization changes for patients served, and the cost of, and demand for, ED Guide services, by focusing on higher acuity patients. Following a merger with Allina Health, the Minneapolis-based CKRI, which serves patients with physical disabilities and traumatic brain injury, examined their patient enrollees to ascertain who was receiving CKRI services. After a temporary moratorium on new

[16] The NORC qualitative research team identified recruitment and targeting themes, subthemes, and examples from primary data, triangulating the summary observations of site visit teams and reviews of data coded in the "participant engagement" code (strength, challenge), the "process-other" code family and NVivo key word searches. See Appendix D for more details.

[17] CCNC, CLTCEC, J-CHiP, LifeLong, PPMC, SCRF, St. Francis, U New Mexico, and UT Houston.

enrollment, CKRI revised its implementation inclusion criteria to serve patients with higher acuity mental health or behavioral health conditions.

Relationships or partnerships with providers or agencies serving the targeted population and referrals from affiliated programs can be an effective recruitment strategy. St Francis' one-year in-home telemonitoring program for patients with multiple chronic conditions initially relied on a claims-based algorithm to identify high-risk candidates for enrollment, but found that this approach yielded relatively few enrollees and a slow ramp up. Subsequently, the awardee changed their strategy to solicit direct physician referrals, with a simplified intake form. U New Mexico likewise cultivated closer relationships with the four Medicaid MCOs in New Mexico from which they received referrals of enrollees to their outpatient intensivist teams (OITs) located within larger clinics. Concern on the part of the MCOs that the OIT was inefficient and overbuilt for less populated communities may have contributed to an initial reluctance to make referrals. With better sharing of patient information between the OITs and the MCOs, these parties have since achieved a more satisfactory working relationship.

Communication and Health Information Technology

Our initial theme-based findings underscore the centrality of relationships to the efficacy of care delivery and how communication fosters stronger relationships between patients and providers, and among providers. Relationships of trust and credibility are built and sustained by effective channels of communication. A team member of the care transitions program at U Iowa observed, "We build relationships with them [the participants], and if we don't build the relationship, the program falls apart quickly, and this is tough to quantify." The CHRPT portfolio of awardees use health information technology (HIT) to facilitate communication, from enabling long-distance clinical encounters and monitoring of a home-bound participant's vital statistics, to virtual grand rounds and web-based provider decision supports, to the creation of new documents and EHRs and data warehouses for gathering, analyzing, and disseminating information about implementation (process and outcome measures) among providers and sites.

Our preliminary findings reveal the following themes related to HIT and communications[18]:

Telemedicine visits and remote monitoring serve multiple functions, reducing access barriers related to transportation, adding depth to assessments of patient status, and supporting patient and caregiver self-management. Courage Kenny patients face difficulties arranging for transportation during the Minnesota winters; in response, CKRI dispatches telemedicine volunteers (typically retired physicians, nurses, and others with professional health care experience) to a patient's home with a dedicated laptop, to facilitate a virtual appointment with a clinic-based provider and the reporting of vital signs. Another awardee with rural clients, St. Francis, uses telemonitoring as an opportunity to improve clinical adherence and foster self-management, with participants taking their own daily clinical measurements and transmitting them to nurses; the telemonitoring nurses can act on vital sign readings that require immediate clinical attention and provide a record to primary care providers in advance of routine appointments. A third rural

[18] The NORC qualitative research team identified communication and HIT themes, subthemes, and examples from primary data, triangulating the summary observations of site visit teams and reviews of data coded in the "process-other" code family and NVivo key word searchers. See Appendix D for more details.

awardee, U Iowa, tested Skype for tele-handoffs between urban academic medical center and care coordinators at its partner Critical Access Hospitals, to coordinate care and enable pharmacy consults.

Web-enabled videoconferencing and web-based resources for providers (e.g., clinical care guidelines, patient education materials) leverage the scope and reach of awardee interventions. U New Mexico and CCNC each target the largely rural populations of their respective states (New Mexico and North Carolina) and do so in part by offering remote provider decision supports, including weekly Complex Care virtual grand rounds and continuing professional education (U New Mexico) and downloadable clinical care guidelines and patient education materials designed to empower pediatricians to manage complex conditions that might otherwise require a hospital referral (CCNC).

Sharing electronic health record (EHR) information remains a significant challenge. Due to the variety of electronic health records (EHR) in use by awardee and partner sites of care, awardees faced challenges gaining access to partner EHRs or effectively exchanging information between different EHR platforms. These challenges were primarily due to HIPAA requirements limiting access to clinical staff or interoperability issues with sharing health information across multiple platforms and points of care. For example, PCCSB staff reported that their inability to access health information about a patient's hospice use and time of death in a separate EHR system stemmed from HIPAA concerns; as a result they did not learn whether their patients were enrolled in hospice or were deceased. UT Houston reported that they faced interoperability challenges exchanging information with a partner hospital, Hermann Memorial Hospital, since their facility used a different EHR than their partner hospital. In virtually every program that addresses transitions from hospital to SNF, discharge documents and patient summaries either accompany the patient as hard copies or are faxed to the patient's destination.

Awardee partners often lack staff training or organizational capacity to use health information technology. Not only were there challenges to gaining access to EHRs and transmitting information between systems, but at times, staff lacked the training and experience to use HIT tools or awardees lacked the organizational infrastructure to support its use. When U Iowa scheduled tele-handoffs to introduce patients to their care coordinator in their home community, U Iowa staff experienced some infrastructure limitations: WiFi was not always available in parts of the U Iowa hospital, which precluded videoconferencing between patients and their offsite care coordinator and, inevitably, at times technical difficulties arose with the videoconference facilities either at U Iowa or at the critical Access hospital (CAH) where the rural care coordinator was based. Many awardees include HIT as a central part of staff training, for example, Sutter Health includes multiple formal training sessions on Epic in its full week of staff orientation; see the Workforce Development chapter for more information.

Dedicated HIT platforms hold promise for sharing data and supporting implementation. Many awardees attempted to tailor EHR functions to their interventions, for example fields for case management information, creating dedicated solutions for their interventions. UEMS, U New Mexico, and J-CHiP developed tailored software to fill their case management and patient tracking needs, either using the Circe or Salesforce platform, or in the case of U New Mexico, adapting previous HIT used by Project ECHO. Providence Portland had created a robust case management system called PopIntel, built on Tableau software, before receiving HCIA funding, but developed the system further as part of the award. Important data streams, such as some claims data and Medicaid enrollment information, were pulled into

PopIntel, and key functions were added, such as patient summary snapshots and population health analytics. Sutter Health revamped its HIT platform, creating a Pillar-Focused Care Note that organizes patient information according to the AIM rubric, which is usable across HIT platforms.

HIT is used to track ED utilization, to identify prospective enrollees and to monitor implementation. Three awardees (LifeLong, J-CHiP, PPMC) identify frequent ED users for recruitment with electronic notifications. LifeLong recently developed data sharing partnerships with area hospitals, receiving near-daily updates on ED visits that staff use for outreach, and to schedule follow-up appointments. J-CHiP has leveraged its pre-HCIA monitoring of high ED utilizers at Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, enrolling identified patients in order to reduce non-emergent use of the emergency room. The staff of Health Share, the three-county coordinated care organization (CCO) that is part of PPMC, now has access to a state-wide Emergency Department Information Exchange (EDIE), also used in Washington State and northern California, which can document the use of ED services across hospitals. ED Guides, for example, are able to quickly determine whether a participant has recently been seen at another ED and might need to be referred to a community provider, or might be exhibiting signs of drug-seeking behavior and need treatment for a substance use problem.

Portable devices extend the reach of HIT into the field. Many awardees supply field staff with laptops, tablets, or cell phones that are used to record patient information and track the delivery of services. Staff reported that the ability to quickly pull up patient information, and also update patient health information with electronic notes that can be easily shared with the intervention team members during the patient encounter in the community, is very valuable. For example a staff member at SCRF noted that doctors can depend on the notes collected during home visits, which include physical therapy, occupational therapy notes, as well as updated care plan goals.

Text messages are a common and effective means of communicating with participants and their caregivers. Given the ubiquity of cell phones and the ease of communicating via text, awardees are using this form of communication as another way to provide patient-centered care. For example, Providence Portland's Health Resilience Specialists (HRSs) use texting to communicate and build relationships with clients who are unwilling to communicate through other means. CKRI has also used text messaging to communicate with patients, especially to remind patients about upcoming appointments. Independent living specialists (ILS) and staff at the Adult Rehabilitative Mental Health Services will send an appointment reminder via text message to patients 24 hours before, and also the day of, an appointment. Parents of patients of the High Risk Children's Clinic at UT Houston use text messaging to communicate quickly with the Clinic's staff and send images by cell phone in order to determine whether their child's condition needs immediate medical attention. One parent reflected:

> *"They are accessible in whatever way works for us also. Sometimes* [my child will] *have a rash and I'll take a picture of the rash and text it to* [UT Houston provider] *and she'll let me know if I need to come in."*

Community primary care providers come to value awardees' care coordination services and information. In Iowa, for example, U Iowa staff initially faced some skepticism from local primary care practitioners (PCPs), who thought that the academic medical center was taking their patients. Instead, U Iowa staff

reconnected patients or helped patients identify a PCP in their community for follow-up care. One U Iowa staff member estimated that around 15 percent of intervention participants did not have a PCP in their local community and that—while not planned for at the beginning of the intervention—the awardee began connecting all participants with a local PCP.

Awardees' modified discharge and transfer documents improve communication between awardee staff and other providers. These documents are a central focus for U North Texas and VUMC, both of which are implementing modified versions of the INTERACT suite of quality improvement tools; completing and reviewing these documents brings quality improvement teams together and facilitates more timely, effective communication between hospital and residential facility. Many of the awardees reported that their patient summary or discharge forms had not been modified in many years, and that adding important sections, simplifying the forms, and making them easier to read were important for improving communication and coordination among care providers. For example, CCNC created a two-to-three-page discharge summary document, distilled from a discharge packet of hundreds of pages, for each patient. This short, synthesized discharge summary highlights the key information a community provider needs to know to care for the patient and has aided the transition of patients to community care. J-CHiP also retooled their summary discharge document, making it easier to use for other providers at Johns Hopkins and for other providers in the community, such as the partner skilled nursing facilities (SNFs).

Patient and Caregiver Engagement

Patient engagement is a relatively broad construct that includes both the predisposition and capacity to manage one's own health and interventions that promote or enhance self-management.[19] The increased capacity for engagement and self-management on the part of patients and caregivers is posited as a driver of higher quality care, improved health, and lower costs.

One common definition of patient engagement is in terms of patient "activation," which Judith Hibbard and colleagues have studied, developed, and operationalized in the validated assessment tool known as the Patient Activation Measure (PAM). PAM measures "patient knowledge, skill, and confidence for self-management."[20] Patient engagement and caregiver supports are also aspects of community-based, public health or population-level interventions for persons living with multiple chronic conditions.[21] Engaging patients is particularly important for those who are medically complex, given the long duration of chronic illness, compared with an acute event, and the value for patients and their caregivers of ongoing and informed participation over time. Furthermore, care transitions are especially vulnerable times for medically complex patients. Because the patient and/or a family caregiver serve as a common thread across settings, empowering and supporting them can be an effective strategy.

[19] For a recent overview of approaches to understanding patient engagement, see "Health Policy Brief: Patient Engagement," Health Affairs, February 14, 2013. Available at http://www.healthaffairs.org/healthpolicybriefs/brief.php?brief_id=86.

[20] Hibbard JH, Mahoney ER, Stock R, Tusler M, "Do increases in patient activation result in improved self-management behaviors" Health Services Research 42#4 (August 2007): 1443-1463.

[21] Ibid, IOM, 2012.

NORC's first annual report (2014) describes a typology of approaches across the CHRPT portfolio, including:

- *Nurse or peer-led chronic disease self-management initiatives,* which are components of many awardees' programs and often train staff to conduct motivational interviewing (e.g., BIDMC, CKRI, JHU, Northland, PRHI).
- *Advanced care planning* and written directives (e.g., completion of Physician Orders for Life-Sustaining Treatment or POLST forms), which play a central role for patient engagement for four awardees (J-CHiP, Sutter Health, PCCSB, VUMC, U North Texas).
- *Independent living workshops and coaching*, which incorporate a disability rights and empowerment perspective into intervention goals (CKRI, LifeLong, UEMS, URI).
- *Coaching of patients or family caregivers to participate in their own care directly*, whether electronically transmitting their own vital signs to a nurse (St. Francis), developing and carrying out a care plan in partnership with home care aides (SCRF, CLTCEC, UAMS), or for parent caregivers of high-risk children, strengthening their abilities to navigate the health care and long-term care systems, to use durable medical equipment, and to manage their child's symptoms (CCNC, UT Houston).

In the section that follows, we identify theme-based findings that expand on this typology, using coded data from NORC's telephone interviews and site visits, as well as reviews of program documents.[22] Subsequent NORC reports to CMMI will include findings related to patient engagement and caregiver supports from surveys of consumer experience, both those fielded by NORC and those shared by awardees with NORC.

All awardees include patient engagement and/or caregiver supports as part of their interventions. Twenty-two (22) of the 23 awardees have at least one component focused on teaching patients and/or caregivers to manage health (e.g., identify red flag symptoms for follow up, sending blood pressure measurements to a nurse) and to communicate effectively with providers. VUMC does not emphasize this objective, given the relatively high-acuity patient population that is served in a SNF setting, where expectations for engagement are limited; however VUMC and three other awardees (J-CHiP, Sutter Health, U North Texas) do make advanced care planning a priority for their participants. Seventeen interventions teach patients and caregivers how to navigate the health care system and offer coaching or prompts to make doctor's appointments. Fourteen involve participants or caregivers explicitly in either care planning or in setting a patient-centered goal. Seven include a focus on enabling participants to live independently and safely, teaching how to address housing-related hazards and making connections to community services and benefits, and three include a disability rights or independent living skills component.

[22] The NORC qualitative research team identified patient and caregiver engagement themes, subthemes, and examples from primary data, triangulating the summary observations of site visit teams and reviews of data coded in the "participant engagement" code (strength, challenge), the "process-other" code family and NVivo key word searches. See Appendix D for more details.

Caregiver supports are offered by eight awardees as part of engagement. These interventions serve the parent caregivers of medically complex children (CCNC, UT Houston), and caregivers of persons living with I/DD (DDHS, where the typical participant lives in a group setting). Five awardees that serve patients with late-stage disease also include caregiver supports (J-CHiP, Northland, PCCSB, Sutter Health, U North Texas).

Patient engagement is most often delivered in person (22 of 23 awardees). Fourteen awardees also contact patients by telephone. Most awardees (18) include contacts during both the first 30 days post-enrollment and as requested by a patient or caregiver. For two of the awardees (PCCSB, U North Texas), engagement post-enrollment takes place only as the need arises (e.g., upon a call by a patient or caregiver to PCCSB, or upon a change in health or functional status in the case of U North Texas). Engagement activities for 11 of the awardees take place on a weekly basis post-enrollment, either through weekly telephone calls or home visits, or by participation of the enrollee in a class or workshop. Seven awardees maintain engagement and caregiver supports over the long term, for at least two months.

Self-monitoring and performance metrics on patient engagement vary considerably across the portfolio. Six awardees field patient surveys, each assessing a unique, multidimensional construct for patient-centeredness (BIDMC, CLTCEC, CCNC, JHU, PCCSB, SCRF); four assess advanced care planning (PCCSB, SCRF, Sutter Health, VUMC), and PRHI adds intervention-specific process measures, for example, to monitor the completion of disease specific coaching and teach-back for at least 30 minutes, and the percentage of COPD discharges that demonstrate self-management of an inhaler. Six awardees measure patient self-efficacy, knowledge, and behavior, either by way of the 13-item version of the Patient Activation Measure (CKRI, LifeLong, PPMC, UEMS) or with measures tailored to the intervention (Northland, Sutter Health). A number of awardees use a version of H-CAHPS (LifeLong uses a 5-item Health Literacy instrument; PRHI and UIHC use excerpts from hospital-wide surveys to sample their participants) or adapt subsets of CAHPS questions (hospital, clinic, home health, patient-centered medical home versions) for use in free-standing, tailored surveys (DDHS, JHU, Northland, PCCSB, St. Francis, UEMS, UT Houston). SCRF takes a different approach, measuring satisfaction as the percentage of participants who voluntarily remain in the intervention each month.

Patient engagement is usually the responsibility of licensed clinicians, typically an RN, often working with a social worker or a nurse practitioner. Six awardees provide a clinical pharmacist to teach patients and caregivers about the purpose and appropriate use of medications, for frail elders, adults with physical disabilities or multiple chronic conditions, and patients with late-stage disease. Other awardees (PCCSB, U New Mexico) offer medication reconciliation and education delivered by a non-pharmacist. For some of the community-based interventions, engagement and caregiver supports are delivered by CHWs or a combination of clinical and non-licensed staff (e.g., non-hospital arms of JHU and PPMC, UEMS, U New Mexico), and two awardees (LifeLong, URI) use trained peer counselors in this role.

Staff learned that success in self-management and achieving patient-centered goals often involves taking more time, over a longer period than originally planned. One nurse care transition specialist (BIDMC) described how

> *"[w]e learned early on to move patient education up as early as possible in the process and reinforce the concepts over time, rather than just squeeze in education on the last day of the stay. In the past, we had set times to come in and speak with the patients (every 2 hours or so), but we found that patients didn't get discharged in our nice units of time, so we eventually embedded them in the unit so everything could be more fluid."*

According to one member of a primary care resource center at a community hospital (PRHI), motivational interviewing "takes a lot of time. You can find out the root cause while they are here. [I] have a COPD patient who's had it for 15 years, so for me to come in now…it's using the techniques to not turn off the patient. So yeah, you have been using [the inhaler], but it's empty."

Dosage

All of our awardees offer an intervention intended to deliver services at a greater intensity and/or frequency compared with the usual source of care.[23] Calibrating this level of intensity and frequency, or dosage, for a participant or a group, can be difficult, given the variability in what constitutes usual care from place to place. Awardees' implementation experience is heterogeneous across multiple sites for a given awardee, and the ongoing adaptation of intervention elements that is part of rapid learning and innovation make dosage difficult to measure. In subsequent reports to CMMI, we plan to analyze the experiences of selected awardees, where post-implementation dosage may be consistently and meaningfully described and linked with survey or claims data, to better understand whether and how an awardee's specified level of delivery is related to utilization, cost, and patient experience.

Fidelity, Adaptability, and Self-Monitoring

Midstream innovation or adaptability is central to HCIA-funded interventions. Awardees engage in rapid cycle assessment, learning, and quality improvement on multiple fronts: internally, with CMMI and CMMI's evaluators, and with HCIA-funded peers. Under HCIA, both awardees and evaluators generate twelve quarterly reports that provide relatively quick feedback from each awardee to CMMI and from CMMI and the awardee's evaluator back to the awardee. These reports are based on analyzing self-monitoring data reported by awardees, and data (claims, survey, qualitative) collected and analyzed by the evaluator. In practicing rapid cycle reviews and adaptation, each awardee balances the objectives of maintaining fidelity to their program model (e.g., delivering the intervention as intended) and revising their practices in order to better fulfill their program's objectives (e.g., refining targeting criteria to identify those most in need of services).

In this section, we present qualitative findings in three related areas:

- To what extent have the CHRPT awardees maintained fidelity to the central or core elements of their programs?

[23] The RAND evaluation design for the HCIA 1 front-line evaluators defines dosage in terms of three process measures: the mean number of visits or contacts, the average length of a visit or contact, and the frequency of visits or contacts.

- How has the process of rapid review and adaptation modified components of these programs? Are patient or caregiver preferences influential in decisions to change? What, if any, unintended consequences have followed from mid-course corrections?
- To what extent do awardees monitor their own implementation experience and use this self-monitoring to inform changes in practice?

Our preliminary findings from analysis of primary data identifies the following themes[24]:

With few exceptions, fidelity to core model elements has been maintained (e.g., populations targeted, services delivered, intervention objectives). Deviations from fidelity that preserve core elements often reflect changes in reach or targeting, in response to logistical or administrative challenges, or to focus more narrowly on serving enrollees who are most likely to benefit from the intervention or whose participation in the intervention is most likely to generate a return on investment, making the intervention more likely to be sustainable in the long term; for more information, see the patient and caregiver recruitment discussion earlier in this chapter.

Intervention tasks have also been modified post-launch, in order to better achieve core objectives, for example, changing the order or timing of tasks, enhancing services with new elements such as in-service training or patient education, and tailoring the services delivered.

- J-CHiP's post-acute-care (PAC) intervention shifted patient education to begin earlier in the hospitalization, to reinforce concepts over a longer period of time and increase retention; in contrast, VUMC reduced patient education for those in hospital in favor of more intensive education once a patient has been discharged to a SNF partner.
- CKRI, PPMC, and J-CHiP have each placed more emphasis on behavioral health interventions post-launch, in an effort to respond to the changing and complex needs of their participants.

Midstream adaptation that preserves core elements is common and often necessary following a program's introduction. Awardees have modified intervention reach post-launch, in response to exogenous contextual factors such as changes in health care markets; U New Mexico and DDHS both scaled back plans to implement their respective models in multiple states when Medicaid policy changes foreclosed ready implementation (U New Mexico dropped Washington State in order to focus on New Mexico, and DDHS dropped Arkansas to focus on New Jersey and New York). Many awardees have overhauled their IT systems or other means of communicating across the intervention, sometimes more than once post-launch, in efforts to resolve ongoing difficulties in communicating effectively internally or with partners and stakeholders, or to improve the quality of monitoring; BIDMC, J-CHiP, PRHI, Sutter Health, and U North Texas have each revised key communication documents (e.g., discharge summaries, case management notes, INTERACT tools) post launch.

[24] Themes, subthemes, and examples were identified using primary data, as summarized and reduced by NORC's three qualitative research cohort teams and using coded primary data, reviewing process code family for adaptability code (strengths, challenges), process code family for other (strengths, challenges), plus a keyword search using the term "adapt." See Appendix D for more information.

In the domain of workforce development, labor market shortages have motivated some awardees to modify key staff roles in order to maintain fidelity. U North Texas had planned to use master's level clinical nurse leaders as regional managers of their INTERACT intervention but could not successfully compete for and retain these advanced professionals in high demand in their Florida and Texas markets; they turned to training bachelor's level nursing staff in quality improvement, to function in the regional management role. Some duties require staff either more highly skilled than originally envisioned, less highly skilled, or with entirely new skills. PPMC shifted from using CHWs to hiring master's level social workers, with requisite training to work with patients who have experienced trauma. Initially, PCCSB moved from an initial plan to use medical assistants for home-based rapid response triage, to using registered nurses, and then in the past year, to nurse practitioners and palliative care physicians, responding to feedback that certain medical aspects might be missed by RNs without requisite clinical training. Northland has developed a tiered system for care coordinator staffing, assigning a CNA, LPN, or MA to lower-acuity patients and an RN or LSW for higher-acuity patients. Post-launch, many awardees have shifted training from a more didactic, class-based model to a more experiential approach. The workforce chapter that follows has a more detailed presentation of related findings.

Awardees differ markedly in their respective capacities to monitor implementation, to learn from monitoring, and to make changes to intervention activities in response to monitoring data. An awardee's larger organizational capacity or size does not necessarily confer an advantage in self-monitoring, as larger organizations may present administrative and logistic challenges that are not faced by smaller, more nimble organizations. Awardees that are part of larger organizations (e.g., J-CHiP, PPMC, Sutter Health, U Iowa, VUMC) can tap existing quality measurement or performance reporting mechanisms, for example, access to H-CAHPS data collected by an affiliated hospital or employee surveys. Alternatively, it can be more difficult for such an awardee to develop and launch self-monitoring tailored to the needs of their HCIA-funded intervention, where self-monitoring may link with data collected by multiple health IT systems (e.g., hospital EHR, case management and home health applications). CLTCEC, Sutter Health, and U North Texas have devoted considerable effort during their third implementation year to establishing data warehouses and internal learning systems, to enable timely sharing of data and decision-relevant analyses to managers across intervention sites. PPMC also developed a new case management module (PopIntel) that uses claims, utilization, and qualitative data to present a "Health Services Profile" review for their Health Resilience Specialist program. Individual sites within multisite interventions, and smaller sites such as LifeLong, PCCSB, UEMS, and UT Houston, often rely on weekly team rounds or meetings to monitor implementation and identify needed changes in operating procedures or policies.

Summary

The CHRPT awardees have undertaken and shared one or more of these tasks: coordinating and/or delivering care; redesigning workflow or clinical process; developing dedicated technology; engaging patients and/or caregivers in managing their own health; and developing the health and home care workforce. They operate most often in community residential environments and in clinic settings, with several based in hospitals or nursing homes. The portfolio is diverse in the size of the population served and in organizational complexity, ranging from single site interventions, serving one city or group of neighborhoods, to those that span a dozen sites and rely on as many partnerships. For persons at high risk

for hospitalization or transfer to a nursing home, assistive technology and durable medical equipment are essential to everyday living. A number of awardees have increased their enrollees' access to services, connecting patients and clients to providers that can support their lives in community settings.

Across the portfolio, awardees share common experiences in their efforts to address challenges related to recruiting patients and caregivers and optimizing the targeting of interventions to patients most likely to benefit. Likewise, the CHRPT awardees have facilitated communication between patients and providers and have engaged participants and their caregivers in the hard work of behavior change expected to result in improved care, health, and wellbeing. To date, awardees have shown great agility in adapting their programs in the face of unanticipated hurdles, such as the unavailability of payer data for risk-based targeting, and based on program data collected as part of self-monitoring to better achieve their program objectives.

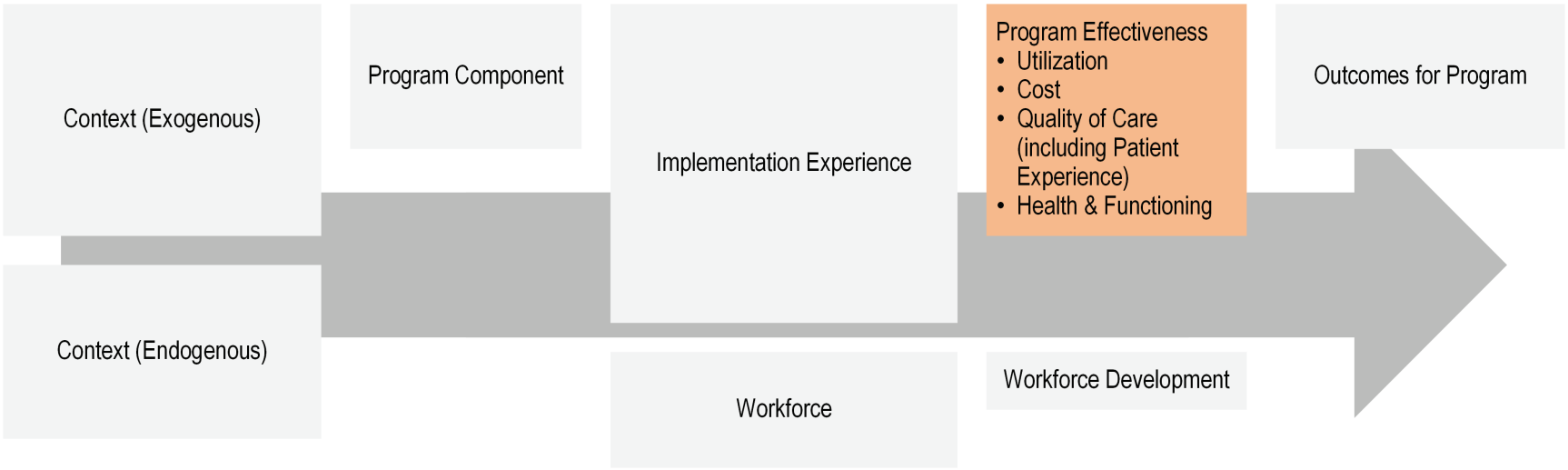
In subsequent reports to CMMI, we plan to continue developing our understanding of select aspects of program implementation that are most relevant to the portfolio, such as advanced care planning. With primary data collection now complete and analysis underway, we expect that we will be able to say more about evaluation domains such as dosage, and to develop linkages in our analysis between implementation experience and outcomes, or program effectiveness.

Program Effectiveness: Interim Findings

Overview

Three years after the Health Care Innovation Awards projects launched, what can we conclude about the effectiveness of the initiatives targeting their services to complex, high-risk patients, particularly in terms of core outcomes related to utilization, cost, quality of care, and health? This chapter summarizes NORC's assessment of program effectiveness to date, considering analyses of both claims data and surveys of participant experience and, for some awardees, caregiver experience. We integrate information based on primary data collected through surveys, interviews, and focus groups that relates to program expenditures, quality of care, health outcomes, and impacts on priority populations. Exhibit 4.1 depicts the domains presented in this chapter, shown within the context of our evaluation's conceptual framework.

Exhibit 4.1: Program Effectiveness: A Visual Guide



We see promising evidence of reduced utilization and cost savings for approximately a third of the awardee interventions. Overall trends also suggest award programs make important quality of care and health impacts. Ten awardees show decreases in hospitalizations, readmissions or emergency department (ED) visits, with four showing statistically significant decreases for one or more of these core measures. Eight awardees show decreases in cost of care, with four awardees showing statistically significant savings. Six awardees show improvements in measures of quality of care, with four showing statistically significant improvements.

Providing care to complex, high-risk patients, such as those targeted in this evaluation, is both challenging and contextually driven. Given the diversity in health-related characteristics and social situation in the CHRPT portfolio, models may not be readily applicable in another setting. Given the considerable expense attached to managing patients in this portfolio, however, it is important to identify the common aspects of promising models. Several emerging themes may have implications for successful programs.

The first common thread is the value of targeting interventions to the population most likely to benefit. Awardees that are able to more narrowly define the kinds of patients to be served are more likely to show evidence of effectiveness. As discussed in the previous chapter, several awardees found themselves without access to utilization data that they had planned to use to risk-stratify and target their services to higher risk patients. Also, many awardees target diverse, heterogeneous populations, sometimes encompassing groups too frail to benefit or unready to change. We note "windows of opportunity" for high-risk populations that include transitions between settings, onset of an acute event, and the last 12 months of life as key intervention points where program innovation can make a difference. Over the next year of this evaluation, we hope to learn which subgroups an awardee serves most effectively.

A second theme is the relevance, in measuring program effectiveness, of the post-intervention time period over which participants' experience is observed. For many awardees, we see significant impacts at 30 days, six months, or one year post-intervention or program enrollment, but these findings are no longer evident at the two-year mark. Some of these short-term gains may justify the cost of the program, given the added quality of care, but these decisions ultimately lie in the hands of payers, who increasingly are charged with providing holistic care to populations of medically complex individuals.

Finally, the varied experience of several awardees that have addressed advance care planning highlights the importance as well as the difficulty of effective planning for end-of-life care for a frail, elderly population. Advance care planning is inherently patient-centered in nature, as it favors community-based care over stressful, often unnecessary, care in hospitals or other institutions. Early conversations with patients and families are more likely to make an impact, but require a significant training investment on the part of a health care system. Conversations about withholding or forgoing treatment are sensitive and may require prior relationships. However, we observed that carefully trained staff were able to implement evidence-based techniques to facilitating decisions and documentation about preferences for multimorbid populations and ultimately end-of-life care. While we have evidence that effective planning can improve care and reduce costs, a successful intervention requires the considerable investment of working with patients and families over time and preparing clinical and care management staff for this work.

Status of Measures and Data Analysis

CMMI has specified four core measures to be reported for every HCIA project, as applicable and feasible. In addition, NORC reports supplemental measures for awardees as data permits; Exhibit 4.2 displays the measures calculated for each awardee, expanding on an overview presented in Exhibit 1.4. In addition to hospitalizations, ED visits, 30-day hospital readmissions, and total cost of care, we calculate timely follow-up practitioner visits (PV) for patients following hospital discharge for awardees with care transitions interventions,[25] and ambulatory care sensitive (ACS) hospital admissions for awardees with interventions addressing primary and continuing care in the community.

Exhibit 4.2: CMMI Core Measures and Key Supplemental Measures, by Awardee

Awardee	Intervention Arm	Core Measures				Supplemental Measures	
		Hospitali-zations	ED Visits	Read-missions	Total Cost of Care	ACS Hospitalizations	Post-discharge PV follow-up
BIDMC		■	■	■	■		■
CLTCEC[1]		■	■				
DDHS		■	■	■	■	■	
J-CHiP	Hospital	■	■	■	■		■
	Community	■	■	■	■	■	
JHU SON		■	■	■	■	■	
LifeLong		■	■				
Northland		■	■	■	■	■	
PCCSB		■	■	■	■	■	
PRHI		■	■	■	■		■
PPMC	All arms	■	■		■		
	Health Resilience (community)	■	■		■		
SCRF		■	■	■	■	■	
St Francis	Hospital (30-day)	■	■	■	■		■
	Community	■	■	■	■	■	
Sutter Health	All participants	■	■	■	■	■	
	End of life	■	■		■		
UEMS[2]		■	■		■		■
U Iowa		■	■	■	■		■
U North Texas	Assisted Living/ Memory Care	■	■	■	■	■	
	All Skilled Nursing	■	■	■	■		
	Skilled Nursing (Florida and Texas)[3]	■	■	■	■		
URI[4]		■	■		■		
UT Houston		■	■		■		
VUMC[5]		■	■	■	■		■

NOTES: [1]Unadjusted comparison only; no rates estimated; [2]Practitioner visit at 30, 60, and 90 days post-enrollment; [3]Total cost of care at 30 and 60 days post-enrollment; [4]Also, behavioral health hospitalization days per month; [5]Also, supplemental analysis of utilization after SNF discharge.

Our findings based on analyses of claims and survey data are incomplete at the end of the second year of the evaluation and do not encompass the entire period of performance for the HCIA projects. In this

[25] We define timely follow-up (a practitioner visit) as occurring within 7 days and 30 days after discharge.

report, the analyses of Medicare claims data typically covers services provided through Dec 31, 2014. Results for awardees that use Medicaid data are usually less recent, because of lags in state data transmittals to CMS and in data that states have provided directly to awardees, and subsequently made available to this evaluation. On average, analyses using Medicare data include six quarters of post-intervention claims data and those using Alpha-Max Medicaid data cover three quarters. Claims data transmitted directly from health plans is likely to be more recent and covers closer to six quarters of data. Findings from claims data do not yet summarize the overall program effectiveness of awardees interventions.

NORC has not completed analysis of survey data collected directly for several awardees, although all survey data collection has finished. In addition, we have not completed analysis of survey data collected and provided to NORC from individual awardees or their internal evaluators, and in some cases awardees are still fielding surveys. The third and final annual evaluation report in fall 2016 will encompass the three-year period of HCIA implementation, with a report addendum published later that includes awardee performance during subsequent months for those awardees with no-cost extensions past June 30, 2015. This report represents an intermediate step in our evaluation, beyond the case descriptions of awardees, to present findings based on performance indicators. We have not yet fully integrated the evaluation's qualitative and quantitative findings to identify and systematically characterize the factors that support and hinder successful implementation and performance.

Analyzing Claims to Identify Change: Limits to Generalizability

As noted above, a number of important caveats apply to findings related to program effectiveness based on analysis of Medicare and Medicaid claims data. These include the time periods for which claims data are available (compared with the time period for implementation); the representativeness of the sample of participants (i.e., fee-for-service Medicare beneficiaries and/or Medicaid beneficiaries versus all program participants) whose claims are analyzed (compared with the experiences of all participants served by an awardee); and the extent to which we can make meaningful comparisons of participant experiences across awardees, given the differences in demographics, health status, and other measured characteristics. Appendix C provides details on analytic strategies, including propensity score approaches and other statistical techniques to match comparators, and caveats as to the generalizability of findings.

For each awardee analysis, we identify a subset of participants for whom claims are available to create the analytic sample. Exhibit 4.3 presents both the cumulative unique number of participants that awardees report to CMMI on a quarterly basis *and* the size of the analytic sample that NORC derived using awardee finder files and the CMS Medicare and Medicaid databases or analytic data sets provided by awardees. NORC cannot confirm the accuracy of the awardee-reported participation estimates; however, these estimates are helpful to understand the likely representativeness or bias of the analytic sample as related to the full population served by the awardee's innovation.

The proportion of the overall population an awardee serves that is represented in the Medicare and/or Medicaid data sets available for this evaluation varies by awardee. In some cases, the number of observations in the Medicare or Medicaid data set is comparable to the awardee's entire service population because Medicare or Medicaid coverage is a criterion for participation in the intervention. In

other cases, public program beneficiaries comprise only a subset of the awardee's target population. In the latter case, the sample of program participants present in the analytic data set may differ systematically from the entire population served.

Exhibit 4.3: Number of Participants in Awardee Program versus the Number of Observations in the Evaluation's Analytic Sample

Awardee	Intervention Arm	Cumulative, Unique Number of Participants	Number of Observations in Analytic Sample (Beneficiaries or Beneficiary-episodes**)
BIDMC		2,236	2,853 **
DDHS		2,192	242
J-CHiP	Hospital	71,747	27,097 **
	Community		1,713
JHU SON		258	110
LifeLong		308	207
Northland		809	410
PCCSB		1,311	785
PRHI		5,385	3,009 **
PPMC	All arms	13,617	10,110
	Health Resilience Program (community)		945
SCRF		671	139
St Francis	Hospital (30-day)	1,426	59 **
	Community		127
Sutter Health	All participants	8,340	3,929
	End of life		2,307
UEMS		1,610	347
UIHC		1,942	2,517 **
U North Texas	Assisted Living/ Memory Care	10,249	1,240
	All Skilled Nursing		6,392 **
	Skilled Nursing (Florida and Texas)		1,584 **
URI		323	286
UT Houston		267	87
VUMC		1,648	670 **

NOTE: *Cumulative, unique number of participants is as self-reported by awardees for HCIA11QR Report. **The unit of analysis for post-acute care awardees is beneficiary-episodes before and after implementation of the intervention, with program effectiveness measured at the level of the awardee site(s) relative to comparison peer providers/sites.

Utilization of Health Services

Care coordination and chronic disease management are central features of the CHRPT awardees' interventions, and CMMI's core utilization measures (hospitalizations, ED visits, and hospital readmissions within 30 days of an index hospitalization) capture their effectiveness. In this section, we summarize NORC's claims-based findings related to utilization, looking at results from two kinds of analysis.

- **Difference-in-Differences (DID) Analyses for Awardees with Comparison Groups**: In these analyses, for community interventions, we compare differences between program participants' experiences before and after program enrollment, with those for a comparison group. For post-acute interventions, we compare differences between beneficiary-episodes at the awardee site before and after program implementation, with those for a comparison group. The ability to conduct DID analyses for awardees with a comparison group requires data for both the pre- and post-program periods. [26]
- **Time-Series Analyses for Awardees without Comparison Groups**: In these analyses, for community interventions, we compare experiences for participants before and after enrollment. For post-acute interventions, we compare beneficiary-episodes at the awardee site before and after program implementation.

Comparison groups have been constructed wherever possible, to improve the validity of our analyses. In subsequent reports, we expect to further increase the number of awardees for which we include at least one comparison group. See Appendix C for details.

Awardees with comparison groups. For six awardees with comparison groups, we find decreases post-implementation in one or more core utilization measures, relative to the comparison group, with three awardees showing significant decreases. We observe the following findings for community awardees (Exhibit 4.4) and hospital-based awardees (Exhibit 4.5):

- Among the community awardees, Sutter (End of Life subgroup analysis only) and UT Houston show significant decreases post-implementation in hospitalizations, relative to the comparison group, while PCCSB, UEMS, and UT Houston show significant decreases in ED visits. UEMS also shows non-significant decreases in hospitalizations.
- None of the hospital-based awardees show significant decreases in measures of utilization, relative to their comparison group. We observe sizable non-significant decreases in ED visits for PRHI, UIHC and VUMC.

[26] Our ability to do DID analyses for awardees depends on (i) our ability to identify a comparison group (e.g. for PPMC we are able to identify a comparison group for only one intervention), and (ii) availability of data for both pre and post periods (e.g., we do not have such data for University of Texas Houston or the Sutter AIM program's end of life analysis).

Exhibit 4.4: Difference-in-Differences Estimates§ for Utilization per 1,000 Beneficiaries, for Community-based Awardees with Comparison Group

Awardee	Intervention Arm	Hospitalizations per quarter	ED Visits per quarter	30-day Hospital Readmissions per quarter
LifeLong		21	18	
Northland		-8	-11	2
PCCSB		-0.5	**-37.2*** **	3.2
PPMC	Community (Health Resilience Program)	25**	61***	
Sutter	End of Life	**-88*** **	16	
UEMS		-33	**-207*** **	
URI		405	178	53 (behavioral health days)
UT Houston		**-52** **	**-100*** **	

NOTE: *p<0.10, **p<0.05, ***p<0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. Unfavorable results reaching statistical significance are not bolded.
§Estimates obtained from difference-in-differences analyses comparing change in outcomes for awardee's beneficiaries before and after program enrollment, relative to comparison group.

Exhibit 4.5: Difference-in-Differences Estimates§ for Utilization, per 1,000 Beneficiary-Episodes for Hospital-based Awardees with Comparison Group

Awardee	Intervention Arm or Supplemental Analysis	Hospitalizations, 90 days post-discharge	ED Visits, 90 days post-discharge	Hospital Readmissions, 30 days post-discharge
BIDMC		-4	12	-1
J-CHiP	Hospital	17**	3	5
PRHI		-2	-14	1
U Iowa		37	-29	49
U North Texas	SNF (discharges from 6 Florida and Texas hospitals)	22.5	-3.9	23.5
VUMC	All	25	-35	-4
	Utilization after discharge from SNF	24	-31	4

NOTE: *p<0.10, **p<0.05, ***p<0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. Unfavorable results reaching statistical significance are not bolded.
§Estimates obtained from difference-in-differences analyses comparing change in outcomes for awardee's beneficiaries-episodes before and after program implementation, relative to comparison group.

Awardees without comparison groups. We observe decreases in one or more core utilization measures for four awardees without comparison groups, with one awardee showing statistically significant decreases in ED utilization. For community-based awardees without a comparison group, we should interpret these findings with caution since complex/high-risk patients enrolled in the awardee programs would be more likely to show increases in utilization of care after program enrollment due to disease progression. Also, in the absence of an external comparison group for PAC awardees, we attribute observed changes in utilization for beneficiary-episodes before and after program implementation at the awardee site to the awardee program alone. Accordingly, we observe the following findings for community awardees (Exhibit 4.6) and hospital-based awardees (Exhibit 4.7):

- The PPMC community interventions show significant decreases in ED utilization. We observe non-significant decreases in hospitalizations for participants enrolled in the St. Francis community intervention, and non-significant decreases in ED visits for participants enrolled in DDHS and SCRF.
- None of the hospital-based awardees show significant decreases in utilization. We observe a non-significant decrease in hospitalizations for the St. Francis 30-day program.

Exhibit 4.6: Difference in Utilization§, per 1,000 Beneficiaries, for Community-based Awardees without Comparison Group

Awardee	Intervention Arm	Hospitalizations per quarter	ED Visits per quarter	30-day Hospital Readmissions per quarter
DDHS		0.2	-7.1	9.6
J-CHiP	Community	5.4	11.9	17.2
JHUSON		15.5	7.0	10.3
PPMC	Community programs, including Health Resilience	25.4***	**-55.3*** **	
	ED Guides	12.4***	24.4***	
SCRF		26.2	-8.7	14.3
St Francis	Community (1 year)	-35.4	1.4	19.0
Sutter Health	Living	3.5	6.0	29.7***
U North Texas	Assisted Living/ Memory Care	23.1***	18.6***	6.1**

NOTE: * p<0.10, **p<0.05, ***p<0.0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. Unfavorable results that reach statistical significance are not bolded. §Adjusted difference in utilization obtained from interrupted time-series analyses comparing change in outcome for awardee's beneficiaries before and after program enrollment.

Exhibit 4.7: Difference in Utilization§, per 1,000 Beneficiary-Episodes, for Hospital-based Awardees without Comparison Group

Awardee	Intervention Arm	Hospitalizations, 90 days post-discharge	ED Visits, 90 days post-discharge	Hospital Readmissions, 30 days post-discharge
St Francis	Hospital (30 Day)	-38.2	39.5	6.5

NOTE: * p<0.10, **p<0.05, ***p<0.0.01. §Adjusted difference in utilization obtained from interrupted time-series regression comparing change in outcome for awardee's beneficiaries-episodes before and after program implementation.

Total Cost of Care

An important impetus for HCIA funding is the promise of reduced cost while maintaining or improving health care quality and outcomes. For the CHRPT portfolio, improved quality comes at a considerable cost due to the frailty of intervention populations and the cost associated with diligent disease management. Cost is also confounded by mortality, where length of life impacts expenditures and identifying suitable, "at-risk" comparators is critical. Finding a suitable comparator is particularly challenging for CHRPT awardee programs such as PPMC and LifeLong, which have effectively identified and served a large proportion of the high-risk patients in their target population, leaving few suitable comparators with similar characteristics. Lastly, many awardees are not adequately powered to examine cost savings; analysis of smaller awardees may be focused on key measures of utilization.

Despite many factors working against the realization of cost savings, we note that two awardees with comparison groups reduced overall cost of care.

Awardees with Comparison Groups. We observe the following findings for awardees' community interventions and hospital-based interventions for which there are comparison groups (Exhibit 4.8):

- Four community awardees show significant decreases in total cost of care per beneficiary per quarter, relative to the comparison group. Northland, Sutter (EOL analysis), UEMS, and UT Houston[27] each show statistically significant savings per beneficiary per quarter.
- None of the hospital-based awardees shows a significant decrease in 90-day total cost of care for beneficiary-episodes after program implementation, relative to a comparison group. Three awardees, PRHI, VUMC, and J-CHiP show savings that are not statistically significant.

Exhibit 4.8: Difference-in-Differences Estimate[§] for Total Cost of Care, for Community and Hospital-based Awardees with Comparison Group

Awardee	Intervention Arm or Supplemental Analysis	90-day Total cost of care per beneficiary-episode	Total cost of care per beneficiary per quarter
BIDMC		$1,156	
J-CHiP	Hospital	$-494	
Northland			**$-1,338***
PCCSB			$28
PPMC	Community (Health Resilience)		$1,024*
PRHI		$-1,508	
Sutter Health	End of Life		**$-6,047*****
UEMS			**$-1,072***
U Iowa		$2,968	
URI			$1,794
U N Texas	Discharges from 6 FL and TX SNF	$-2,025	
UT Houston			$-1,022 **$-1,452**[†]**
VUMC	All	$-1,000	

NOTES: *p<0.10, **p<0.05, ***p<0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. [§]Estimates obtained from difference-in-differences analyses comparing change in outcomes for awardee's beneficiaries/beneficiary-episodes before and after program enrollment/implementation, relative to comparison group. [†]The second cost variable excludes certain outpatient services provided by school districts, level II HCPCS codes, and Level 1 HCPCS codes related to home health, psychiatry, SNF, durable medical equipment, psychotherapy and speech/physical therapy, to focus on the medical services component of cost.

Awardees without Comparison Groups. We observe statistically significant savings in total cost of care for only two awardees without comparison groups. For community interventions without comparison groups, we should interpret these findings with caution since complex/high-risk patients enrolled in awardee programs would be more likely to show increases in cost of care after program enrollment due to disease progression. Also, in the absence of an external comparison group for awardees with post-acute interventions, we cannot attribute observed changes in cost of care for beneficiary-episodes at the

[27] For UT Houston, when the analysis of cost of care is limited to medical and hospital services and excludes other Medicaid covered services such as durable medical equipment and in-home nursing care, the result is statistically significant. Both cost results (limited to medical and hospital, and comprehensive services) are presented in Exhibit 4.8.

awardee site before and after program implementation to the awardee program alone. Accordingly, we observe the following for community awardees (Exhibit 4.9) and hospital-based awardees (Exhibit 4.10):

- Only two community awardees show decreases in total cost of care (Exhibit 4.9). U North Texas, Assisted Living/Memory Care arm shows statistically significant cost savings. St. Francis' 1-year program shows a non-significant cost savings per beneficiary per quarter.
- Two awardees with post-acute interventions show decreases in 90-day total cost of care for beneficiary-episodes after program implementation, compared to beneficiary-episodes at the awardee site before program implementation. St Francis' 30-day post-hospital intervention and U North Texas Skilled Nursing Facility (SNF) arm show statistically significant savings in 90-day total cost of care.

Exhibit 4.9: Difference in Quarterly Total Cost of Care per Beneficiary, for Community-based Awardees without Comparison Group§

Awardee	Intervention Arm	Total Cost of Care per beneficiary per quarter
DDHS		$339
J-CHiP	Community	$1,328***
JHUSON		$729
PPMC	Community programs, including Health Resilience	$678**
	ED Guides	$428***
SCRF		$1,107
St Francis	Community (1 Year)	$-794
Sutter Health		$3,183***
U North Texas	Assisted Living/Memory Care	**$-1,833*** **

NOTES: * p<0.10, **p<0.05, ***p<0.0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. An unfavorable result that reaches statistical significance is not bolded. §Adjusted difference in quarterly cost of care per beneficiary obtained from interrupted time-series analyses comparing change in outcome for awardee's beneficiaries before and after program enrollment.

Exhibit 4.10: Difference in 90-day Total Cost of Care per Beneficiary-Episode§, for Hospital-Based Awardees without Comparison Group

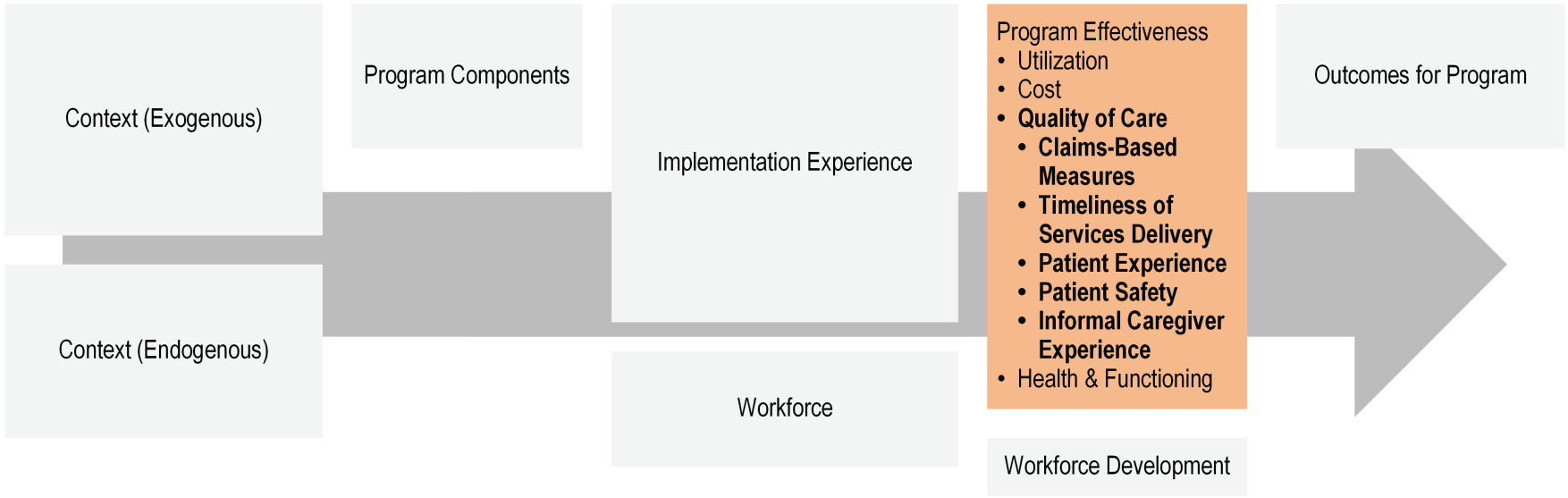
Awardee	Intervention Arm	90-Day Total Cost of Care per Beneficiary-Episode
St Francis	30-day post-Hospital Intervention	**$-16,868*** **
U North Texas	SNF (all)	**$-1,646*** **

NOTES: * p<0.10, **p<0.05, ***p<0.0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. §Adjusted difference in 90-day cost of care per beneficiary-episode obtained from interrupted time-series analyses comparing change in outcome for awardee's beneficiary-episodes before and after program implementation.

Quality of Care

Our evaluation's examination of quality is multidimensional. It includes timeliness of services delivery, patient experience of care, patient safety, and informal caregiver experience, as well as claims-based indicators of high quality care. Exhibit 4.11 depicts these domains of quality in the context of our conceptual framework.

Exhibit 4.11: Quality of Care, CHRPT Evaluation: A Visual Guide



Claims-based Measures

Apart from core measures of utilization and cost of care, we study program effectiveness for awardees in improving claims-based measures of quality. For awardees with community-based interventions, we assess program impacts in improving quality of care for program participants by measuring the impact of their program on hospitalizations for ambulatory care sensitive (ACS) conditions. For awardees with post-acute interventions, we assess program impacts in improving primary care follow-up for beneficiary-episodes, within 7 and 30 days following discharge.

Awardees with Comparison Groups. Four awardees with comparison groups show improvements in quality of care, with two showing statistically significant improvements (see Exhibit 4.12):

- None of the community awardees show statistically significant decreases in ACS hospitalizations. Northland shows non-significant decrease in ACS hospitalizations, relative to its comparison group.
- One community awardee, UEMS, shows non-significant increases in primary-care follow-up for its patients, relative to the comparison group.
- Two hospital-based awardees, BIDMC and PRHI, show significant improvements in primary care follow-up for their beneficiary-episodes after program implementation, relative to their comparison group.

Exhibit 4.12: Difference-in-Differences Estimates[§] for Quality of Care, for Awardees with Comparison Groups

Awardee	Intervention Setting	Intervention Arm or Supplemental Analysis	ACS Hospitalizations per 1,000 Beneficiaries	Primary Care Follow up Post-Discharge, Per 1,000 Beneficiary-Episodes or Beneficiaries[§§]	
				7 Days	30 Days
BIDMC	Hospital			18	**20****
J-CHiP	Hospital	Hospital		-12	-3
Northland	Community		-6		
PCCSB	Community		-1.4		
PRHI	Hospital			**61****	**34*****
UEMS	Community			2	55
U Iowa	Hospital			16	-17
VUMC	Hospital	All		n/a	-4

NOTES: * p<0.10, **p<0.05, ***p<0.0.01. A finding is depicted in bold when it reaches statistical significance and indicates an improved outcome, for example, fewer hospitalizations. [§]Estimates obtained from difference-in-differences analyses comparing change in outcomes for awardee's beneficiaries or beneficiary-episodes before and after program enrollment/implementation, relative to comparison group. [§§]The unit of analysis for community-based awardee interventions is beneficiaries, while the unit of analysis for hospital-based awardee interventions is beneficiary-episodes.

Awardees without Comparison Groups. Two awardees without comparison groups show statistically significant improvements in quality of care. For community awardees without comparison groups, we should interpret findings for ACS hospitalizations with caution, due to limitations described earlier. Also, in the absence of an external comparison group for PAC awardees, changes in measures of primary care

follow-up cannot be attributed to the awardee program alone. Accordingly, we observe the following findings for community awardees (Exhibit 4.13) and hospital-based awardees (Exhibit 4.14):

- Two community awardees, St. Francis and Sutter Health, show statistically significant improvements in quality of care in the post-intervention period, measured by the rate of ACS hospitalizations (Exhibit 4.13).
- The St. Francis hospital (PAC) program shows statistically significant improvements in quality of care, with beneficiary-episodes after program implementation having higher rates of 7-day and 30-day primary care follow-up, compared to beneficiary-episodes at the awardee site before program implementation. (Exhibit 4.14)

Exhibit 4.13: Difference in Quality of Care§, per 1000 Beneficiaries, for Community-based Awardees without a Comparison Group

Awardee	Intervention Arm	ACS Hospitalizations per quarter
DDHS		-1.9
J-CHiP	Community	1.6
JHUSON		10.2
SCRF		6.2
St Francis	Community (1 Year)	**-34.0****
Sutter Health	All	**-8.6*****
U North Texas	Assisted Living/ Memory Care	18.6**

NOTE: * p<0.10, **p<0.05, ***p<0.01. Findings are depicted in bold where statistically significant and positive. An unfavorable result that reaches statistical significance is not bolded. §Adjusted difference in outcome obtained from interrupted time-series analyses comparing change in outcome for awardee's beneficiaries before and after program enrollment.

Exhibit 4.14: Difference in Quality of Care§, per 1,000 Beneficiary-Episodes, for Hospital-based Awardees without a Comparison Group

Awardee	Intervention Arm	Difference in Primary Care Follow-up Post-Discharge per 1000 Beneficiary-Episodes	
		7 Days	30 Days
St Francis	Hospital (30 Day)	**187.9****	**114****

NOTE: * p<0.10, **p<0.05, ***p<0.01. Findings are depicted in bold where statistically significant and positive. §Adjusted difference in outcome obtained from interrupted time-series analyses comparing change in outcomes for awardee's beneficiary-episodes before and after program implementation.

Timeliness of Services

Assessment of timeliness relies on multiple considerations, including the expectations set by the awardee for intervention participants and the intention of an awardee to improve access or timeliness. In our evaluation, timeliness is an aspect of patient and caregiver experience, and it can be difficult to tease out the role of timeliness and the ways in which it contributes to a positive experience and the consequences when timeliness is lacking.

Survey findings as of this report are limited to one awardee, CKRI, which included a domain combining accessibility and timeliness; see CKRI's awardee chapter for details about survey design and administration. Most respondents (88 percent) reported getting the help they needed at the time they needed it. Of those who needed help in the evenings and on weekends (N=43), 70 percent were able to get the help they needed during those times. Eighty (80) percent had someone at CKRI whom they could call directly if they had health problems. Most (82 percent) felt that their doctor or nurse spent enough time with them during appointments.

Coded primary data can offer insights into whether services were delivered in a timely manner, from the perspectives of the awardee as well as those of participants and their caregivers.[28] We note the following themes:

Coordination increases the rapidity of communication among providers that would otherwise delay care delivery. For example, a BIDMC PACT clinical nurse can connect clinicians in the field (visiting nurses) directly with the primary care provider via email; this interaction would have been delayed without the HCIA-funded liaison. For CKRI, one goal is to avoid having the patient wait while information is gathered, a "first call resolution" of an issue, which is made easier by the colocation of providers. U New Mexico participants praise ECHO Care for arranging for timely specialist appointments and for home visits, which sidestep delays that would otherwise exist due to lack of transportation.

Patient navigation services improves timeliness of access to primary care. Navigators employed by a number of awardees are credited with cutting through paperwork and other administrative obstacles to arrange appointments more quickly than patients or their families experienced in the past. For UEMS patients, CHWs schedule follow up appointments with reduced wait times, although long waits for PCP appointments remain an issue. One Sutter AIM administrator noted obtaining timely access to PCP for participants post-discharge (7 to 10 days afterwards), and for the PCP even to know that a patient was hospitalized, as the biggest problem.

Coordination lessens the need for referral to a specialist, which often involves a delay. In addition to reducing ED utilization, a number of awardees aim to reduce the demand for specialty care. This is a particular focus for U New Mexico, CCNC, and U Iowa interventions that cover rural and urban areas where shortages of mental health and other specialists can result in lengthy waits for appointments.

Coordination that includes integration of primary and specialty care (colocation) can improve timeliness. Awardees CKRI, DDHS, and URI are implementing such a model; timeliness in these cases may be promoted by longer appointments, where clinicians can address a list of concerns presented by a participant and review patient-centered priorities for care (CKRI).

Patient Experience

Our most systematic information on patient satisfaction comes from surveys that NORC has fielded in collaboration with awardees or where awardees have shared data from their own ongoing surveys. A number of awardees field or use ongoing Consumer Assessment of Healthcare Providers and Systems

[28] For this report, we conducted text word queries (delay, wait) and reviewed notes coded with the "process-other" node.

(CAHPS) patient experience surveys. The NORC consumer surveys use a set of domains similar to that of CAHPS, to facilitate comparisons across types of data and across awardees. We do not use a single construct for patient satisfaction, which would not be meaningful given the diversity of target groups served by our portfolio of awardees and of the interventions themselves and their objectives. As of this report, we have findings from the CKRI patient survey, presented in Appendix F in the section on the Courage Kenny Research Institute program. In subsequent reports, we expect to present findings from consumer experience surveys for a number of awardees (CLTCEC, DDHS, LifeLong, Northland, PCCSB, SCRF). In addition, some awardees' self-monitoring includes results from patient satisfaction surveys (J-CHiP, JHUSON, UIHC, SCRF).

Overall, CKRI consumer survey respondents expressed satisfaction with many aspects of the HCIA-funded intervention, and with their care coordinator in particular, with the majority reporting that most or all of their providers understood what it is like to live with a disability and that their provider considered the financial, emotional, or other costs of the things that they recommended. Four out of every five respondents reported being satisfied or very satisfied with their physicians and care coordinators. Care coordinators and independent living specialists (ILS workers) played important roles by connecting participants to the services they needed. Several respondents said that the most important thing their care coordinator did was help them access available and appropriate services, by scheduling appointments, coordinating tests and screenings, handling medications, and getting doctor's orders. Care coordinators facilitated access to services including transportation, sign language services, physical therapy, medication management, and durable medical equipment.

While NORC's evaluation uses survey findings to systematically document aspects of patient and caregiver experience, related observations are also captured through focus groups and interviews with intervention staff, as well as with patients and caregivers themselves. As might be expected, respondents have consistently expressed high levels of satisfaction when asked about their experiences with the awardee's program. This is likely to reflect selection biases, as focus group participants and interview subjects have been recruited, at NORC's request and according to recruitment guidelines, by the awardee.

However, the specific aspects of experiences of care that we have elicited in these conversations are noteworthy:

- *Staff attentiveness to participants and caregivers*. A number of respondents expressed their appreciation to staff for listening carefully: "patients have so much to say, and they are happy that someone is listening" (J-CHiP). Listening can be enhanced by the setting, as a JHU SON staffer describes "the focus on the participant, making them feel like they matter and they really appreciate what we are doing for them just as simply by listening to what they want. Coming in [to a participant's home] and making them feel like they are the main focus." Or as one U New Mexico participant observed, "When someone visits your home, it humanizes you. Before this, I was just a number. They give you better care if they can see your face." Respondents praise the process of focused listening (a hallmark of motivational interviewing), noting that "They make you feel like a person and not like a number" (CKRI) or that "she listened to me very carefully and gave me advice. I am healing without medicine" (LifeLong). NORC's site visit team observed that DDHS intervention staff addressed their patient first, rather than the group home

supervisor who was accompanying a patient to the clinic, an important sign of respect that persons with disabilities do not always receive in clinical settings.

- *A single staff point of contact*. One CKRI staff member's remarks could apply to other awardees as well: the "care coordinator can speak to patients weekly, monthly, daily—the least would be quarterly. They are the hub of our patients' care; everything goes into them and they disperse it to where it could go out. They are the first line for our patients for emergency needs, to triage it and avoid an ER visit by getting them in with a clinician to make a detailed plan for that."
- *Staff functioning as the participant's representative or proxy*. One LifeLong CCI participant described how participation improved the clinical encounter "[The nurse care manager] went with me, and stayed with me through it all. A lot of people who go to appointments with me would drop me off and leave. When you are blind, you get kind of scared. She stayed with me, and all of the doctors explained to her everything. That is the reason I am lost without her….Because [she] was a skilled nurse, and that's the kind of person that I need."
- *Facilitation of difficult conversations*. Participants from PCCSB, Sutter Health, and U North Texas all mentioned their satisfaction with the opportunities created for ongoing engagement around end of life, whether learning about the consequences of a decision to accept cardiopulmonary resuscitation or a feeding tube or laying out a participant's priorities. As one Sutter staff member explained, "Having a conversation [about] end of life options allows everyone to breathe."

In contrast, explanations for dissatisfaction related to the scope of intervention tasks noting differences in understanding between participants and staff with respect to the extent and boundaries of the relationship or service.

- *Organizational transitions.* Several awardees or their provider partners have undergone mergers or internal reorganizations; sometimes these have affected participants' experience with services or relationships with specific providers. For example, the merger of Courage Kenny with Allina Health introduced new processes for making appointments, refilling prescriptions, and staff reassignments, which were reported by some participants as hindering their access to care or appropriate follow up, relative to their prior experiences with Courage Kenny.
- *Dissatisfaction linked to gaps in services*. Participants and their caregivers may have needs that are not addressed within the scope of the intervention. For example, behavioral health consultations or services are not offered through the Sutter Health intervention; however, patients and their caregivers may want round-the-clock access to providers despite budget or staffing constraints (e.g., interest in PCCSB offering 24-hour daily on-call service, rather than the 12 hours currently supported through the intervention). For interventions with multiple arms, expectations set for a participant in one context can become the basis for judging satisfaction in another; for example, a patient expressing frustration with diminished access to in-person clinical care once support shifted from home health to periodic telephone calls.
- *Value of setting expectations and boundaries for the intervention*. Caregivers involved in interventions that include home visits for care coordination and patient education have expressed their disappointment or confusion that these visits don't include hands-on home health services

(e.g., one SCRF respondent said that the nurse consultant "doesn't have any of the equipment with her that a nurse should have") or frustration that triage home visits following a hospitalization do not encompass nursing (e.g., in the case of PCCSB, requests for home nursing support around complex wound care).

Patient Safety

Within the CHRPT portfolio, awardees take a wide range of approaches to patient safety and the creation and use of related data.[29] They are addressing patient safety at levels from incidental to foundational for their respective interventions. We consider the extent to which awardees incorporate patient safety into their interventions, whether as an intended outcome of an intervention task, a process or outcome self-monitoring measure, or an aspect of staff development. For this analysis we examine the most recent version of each awardee's monitoring and measuring worksheet (for HCIA Reporting Quarter 11, for the time period January 1 through March 31, 2015) and conduct text word queries of coded primary data, using the terms adverse, error, and safety. In subsequent reports, we expect to develop this analysis further, linking findings about patient safety with survey and claims-based analyses of implementation and program effectiveness.

Making patient safety a systematic part of awardee clinical and residential operating procedures. Two awardees (U North Texas, VUMC) are implementing the INTERACT suite of quality improvement tools that include patient safety, and a third awardee (J-CHiP) is also working with partner SNFs to improve care pathways for common conditions seen in post-acute settings. Project leadership have described an important part of their motivation to be patient safety:

> *"So often, it's not a bad doctor or bad nurse, hospital, or CNA. It's the bonehead errors of things that fall through the cracks. What this program is designed to do is to create a system of checklists, protocols, and algorithms to mitigate that risk." [Site Visit Interview with Project Leadership, U North Texas, May 2015].*

Other awardees report some monitoring of patient safety, for example, VUMC tracks pressure ulcers in SNF residents, a proxy measure for safety and quality of care, and U Iowa intervention staff are trained in patient safety reporting (e.g., there are safety-related questions in the U Iowa's REDdCap system).

Improving discharge summaries. Transitions of care discharge summaries (J-CHiP, VUMC) and reconciliation of discharge notes and instructions with outpatient or SNF records, can facilitate clear, complete, and timely communication among providers and reduce the likelihood of medical errors and improve patient safety.

[29] Our evaluation uses a definition of patient safety that is part of the evaluation design prepared by RAND, based on the CFIR, namely, "the extent to which the intervention collects and uses safety data and shares such data publicly as a marker of ongoing commitment to safety and quality." Rojas SL, Ashok M, Dy SM, Wines RC, Teixiera-Poit S, Contextual frameworks for research on the implementation of complex system interventions. Methods Research Report. (Prepared by the RTI International-University of North Carolina at Chapel Hill Evidence-based Practice Center under Contract No.290-2007-10056-I). AHRQ Publication No. 14-ECH014-EF. Rockville, MD: Agency for Healthcare Research and Quality; March 2014. www.effectivehealthcare.ahrq.gov/reports/final.cfm.

Reconciling medication, particularly during care transitions. Many of the post-acute care interventions (BIDMC, J-CHiP, PRHI, Sutter Health, VUMC) include reconciliation and active management of medications for participants, as well as patient education, using a clinical pharmacist. In interviews, clinical staff have praised the quick communication that this process facilitates among providers as improving patient safety by identifying or preventing medication errors or adverse events. Uneven inclusion of safety measures to monitor implementation. For example, Sutter Health has piloted the inclusion of a clinical pharmacist at one of its sites and would like to expand this model but, as of NORC's second site visit (May 2015), has not succeeded in funding or hiring needed pharmacists.

Screening for falls and other home-based hazards. Interventions that deliver services at home, with the goal of keeping participants at home (delaying entry to SNF) include screening for fall risk and home hazards (JHU SON, Northland, PCCSB, PPMC's C-TRAIN program, SCRF). Respondents in two focus groups convened during the Northland site visit described how HCIA-funded case coordinators included safety assessments as part of client home visits and arranged for installation of fall alert and safety equipment. At one of Sutter Health's sites (Yuba), AIM team social workers may be involved in facilitating a move from home to an assisted living or nursing facility if a participant is no longer managing safely at home.

Teaching home care aides about patient safety. For all three awardees involved in training direct care workers (CLTCEC, SCRF, UAMS), curriculum for personal care aides (PCAs) includes patient safety, which is one aspect of improving quality of home-based care. CLTCEC PCA trainees described how their training included learning how to read prescription labels and eliminating safety hazards, such as securing area rugs and using non-slip strips in the bathtub.

What opportunities for patient safety are presented in the CHRPT portfolio? Three areas could be fruitfully expanded upon, including pharmacy, self-monitoring, and public reporting.

- For frail elders, the risk of polypharmacy is high, and the inroads that some of the awardees have made in integrating a clinical pharmacist into transitions of care models or home-based care could be expanded.
- More systematic self-monitoring related to patient safety would raise the visibility of this issue internally, allowing data to suggest improvements. For example, SCRF includes a question for participants at baseline and six months post-enrollment, asking "How satisfied are you with how safely you are handled by your home care aide?"
- Public reporting of performance in the area of patient safety would be desirable for all awardees. At present, there is no public reporting; perhaps not surprising, as interventions are not focused on patient safety and institutional settings for interventions vary markedly from large health care or senior residence organizations to single clinics.

Informal Caregiver Experience

Few of the CHRPT interventions distinguish the needs of caregivers fundamentally from those of the participants whom they serve. For example, none include a formal assessment of caregiver needs nor do they offer a respite or support group for caregivers. However, most interventions that target persons living

with multiple chronic conditions also engage with those participants' caregivers. Patient engagement strategies have the potential to motivate both participants and their caregivers toward greater self-efficacy (or efficacy on behalf of the participant), as well as behavior change that supports improved health and quality of life. Among the CHRPT portfolio, the two awardees that target high-risk children focus mainly on caregivers (CCNC, UT Houston); two offer training for unrelated and family caregivers (CLTCEC, UAMS); and three other awardees are involved with caregivers, due to the frailty or cognitive limitations of participants (DDHS, SCRF, Sutter).

Considered as a group, the CHRPT interventions can positively affect caregivers in several ways, by:

- *Providing a greater sense of security*. Caregivers frequently describe the HCIA-funded interventions as providing a safety net. Being able to call a nurse or someone else for information or to help assess the need for a trip to the hospital ED is consistently noted by caregivers as a benefit. For example, in a focus group of parents of children in the High Risk Children's Clinic (HRCC) at UT Houston, the parents uniformly asserted that the practitioners in the clinic educated and empowered them to use their own judgment. One said, "[We] already know what they're going to tell us to do. So when we call it's more to get confirmation, affirmation that you're doing the right thing. …Because of HRCC's training, I know if I get to a point, then I can reach out, but I think I can handle so much more now."
- *Increasing confidence and efficacy in caregiving skills, especially in communication*. Education of parents about warning signs and management is empowering. This is described by both informal (family) and paid caregivers. As one caregiver described the impact of their training through CLTCEC, "When they [the patient's doctors] hear us speaking with the terminology, we get a more positive response and a better feedback." Another CLTCEC trainee responded, "I had been doing this for 14 years but I never felt sure…This class has given me so much more confidence." A caregiver trained through UAMS echoed this, noting "It helped broaden the spectrum of what was needed to care for her and that we were doing the best to care for her." A corollary of increased confidence is the respect shown by staff to parent caregivers and their knowledge of their child's needs, for example, by asking parents to participate in teaching medical students on rotation in the UT Houston HRCC.
- *Facilitating access to care*. Access may mean improved communication between primary care provider and specialists, referrals to community benefits and services, or acquisition of needed durable medical equipment. As a transitions nurse at BIDMC observed, "It relieves some caregiver stress to know that someone else is checking in. We are a link to the primary care provider and can connect directly, and they don't have to re-explain the story to someone on the telephone and start from square one." A family caregiver for a DDHS enrollee who has Down syndrome notes that "health care is sometimes done to her and not with her, so it can be hard for her to find people to engage with…It's personally stressful to go to the doctor. I have a list of questions but if she's not cooperating I will forget them and the doctor…might miss things too. That's what I really liked about it. Having an environment that was centered about creating a good experience for people." As a UT Houston parent said about the 24/7 phone access to the dedicated clinic supported through HCIA, "The person you call knows the deal and you can come right in…I really, really love this clinic."

- *Improving quality of life and lowering stress*. Caregivers involved with the PCCSB and Sutter programs shared their relief at not having to take days off from work or travel long distances to manage health crises that were addressed by the program at home, without a trip to the hospital or ED. Caregivers for family members at either end of the age spectrum expressed appreciation for being able to maintain their own lives and previous roles. As the adult child of a frail elder in Sutter's AIM program remarked, "It was a relief and confidence building, a reminder to pay attention to self. Reinforced that if [I] don't take care of [my]self, it will all fall apart." The parent of a child with multiple chronic conditions enrolled with CCNC said, "…it allows me to be a mother and not a monitor and nurse. It was a huge shift."

Health, Impacts on Priority Populations

For the patients served by awardees in the CHRPT portfolio, achieving gains in health status is an elusive, if not illusionary goal, given that these patients are high acuity and often in the late stage of disease progression. Stabilizing the condition of such patients or slowing the pace of decline is itself a positive health outcome. Including health-related quality of life or personal wellbeing within the measurement of health status does, however, offer greater scope for considering improvements in patient condition. Thus we consider the effects of awardees' efforts to address patients' own goals and preferences for care and their achievement of greater self-efficacy as part of a holistic concept of health. The impact of awardees' programs on the well-being and psychological and physical health status of family and other caregivers, as well as on patients themselves, further expands the potential for observing improvements in health.

Our evaluation does include some of these health indicators as part of NORC's patient and caregiver surveys or in data collected by awardees as part of their self-monitoring. In subsequent reports, as we complete analyses of consumer surveys fielded both by NORC and the awardees, we will report on indicators of health and wellbeing.

Our evaluation is exploring disaggregated analyses for awardees serving multiple groups, looking separately at dually eligible beneficiaries or persons with psychiatric diagnoses or behavioral health problems. For awardees with larger programs, we will examine variation by site and dosage, using information in available awardee data. Doing disaggregated analyses will depend both on the quality of data and the size of subgroups of interest.

Summary

Preliminary findings on program effectiveness for CHRPT innovations, based on claims-based analyses, hold promise. We see early evidence of reduced utilization and cost savings for approximately one-third of the awardee interventions. Overall trends also suggest awardee programs have had important quality of care and health impacts. In addition, results based on survey and qualitative data offer initial findings of increased timeliness of service delivery, patient and caregiver satisfaction, and a deepened, more comprehensive commitment to patient safety.

Ten awardees show decreases in hospitalizations, readmissions, or emergency department (ED) visits, with four showing statistically significant decreases for one or more of these core measures. Eight

awardees show decreases in cost of care, with four awardees showing statistically significant savings. Seven awardees show improvements in measures of quality of care, with four showing statistically significant improvements. Exhibits 4.15 and 4.16 summarize claims-based, statistically significant findings. Analyses that include comparison groups offer greater analytic certainty.

Exhibit 4.15: Summary, Claims-Based, Statistically Significant Findings of Program Effectiveness, Analyses with Comparison Groups

Awardee	Intervention Arm	Outcomes			Priority Populations
		Utilization	Cost	Quality	
BIDMC				**Increase**	
J-CHiP	Hospital	Increase			African Americans
Northland			**Decrease**		Rural
PCCSB		**Decrease**			
PPMC	Community (Health Resilience Program	Increase	Increase		
PRHI				**Increase**	
Sutter Health	End of Life	**Decrease**	**Decrease**		
UEMS		**Decrease**	**Decrease**		African Americans
UT Houston		**Decrease**	**Decrease***		African Americans, Latinos or Hispanics, children

NOTE: *For analysis limiting cost to medical and hospital services.

Exhibit 4.16: Summary, Claims-based, Statistically Significant Findings of Program Effectiveness, Analyses without Comparison Groups

Awardee	Intervention Arm	Outcomes			Priority Populations
		Utilization	Cost	Quality	
J-CHiP	Community		Increase		African Americans
PPMC	ED Guides	Mixed	Increase		
	Community	Increase	Increase		
St Francis	Hospital		**Decrease**	**Increase**	Rural
	Community		**Decrease**	**Increase**	Rural
Sutter Health	All	Increase	Increase	**Increase**	
U North Texas	Assisted Living/ Memory Care	Increase	**Decrease**	Decrease	

Findings to date are limited because claims data for the awardees' complete period of performance are not yet available and some awardees do not yet have comparators. Likewise, analysis of data from NORC's consumer experience surveys, and from awardee surveys, is not complete.

Over the next year, in two subsequent quarterly reports (December 2015 and March 2016) and the third and final annual report of the evaluation (late 2016), we will analyze and present survey data gathered by NORC and by awardees, link qualitative findings from coded primary data, and conduct additional claims-based analyses for the full period of each awardee's period of performance, with results for the periods of awardees' no-cost extension periods presented in a separate addendum to the final report. We also expect to explore subgroups using categorical variables from awardee data to focus on the effect of dosage on participant experience, ultimately allowing us to identify "what works for whom" in the CHRPT portfolio.

Workforce Development

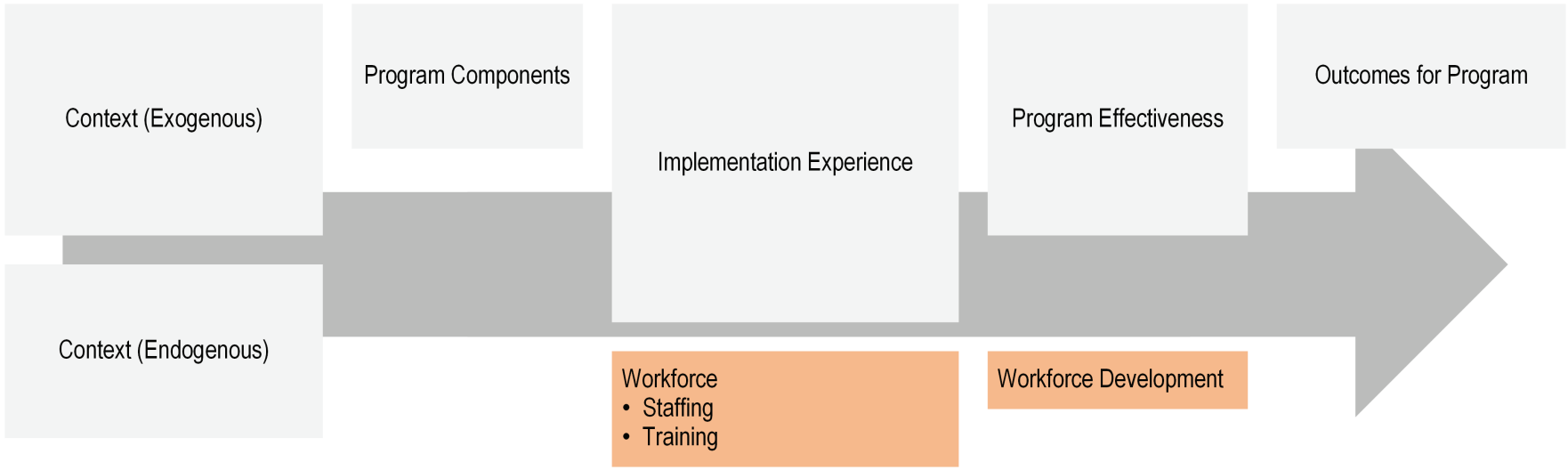
Overview

A key aspect of the Complex/High Risk Patient Targeting interventions is workforce transformation, often built upon established or evidence-based models for care coordination and care transitions. How are these projects staffed? How are staff members prepared for novel roles in care delivery? Are some constellations of staff better for achieving greater efficiency or closing gaps in care? And finally, what are the implications of the changes introduced by these innovative programs that serve medically complex patients for the health care workforce, and for the workforce that delivers long-term services and supports (LTSS)?

In this chapter, we use coded qualitative data to develop theme-based analyses to assess the efficiency and effectiveness of staffing and training to support innovation. We also include descriptive data from awardees' quarterly reports and preliminary analyses from workplace surveys, both those administered by the awardees or their local evaluator and those that NORC has administered directly.

We take a comparative approach to the extent possible, considering pairs and clusters of awardees engaged in similar activities or that serve similar populations with divergent strategies and staffing. We first describe the recruitment, retention, and teamwork components of awardees' programs, followed by a theme-based analysis of staffing as it relates to those components. We then address training in a similar fashion, using the Kirkpatrick model of levels of training effectiveness. Finally, we will outline areas where further data gathering and analysis are needed. Exhibit 5.1 offers a visual guide to this chapter, linking findings to our evaluation's conceptual framework.

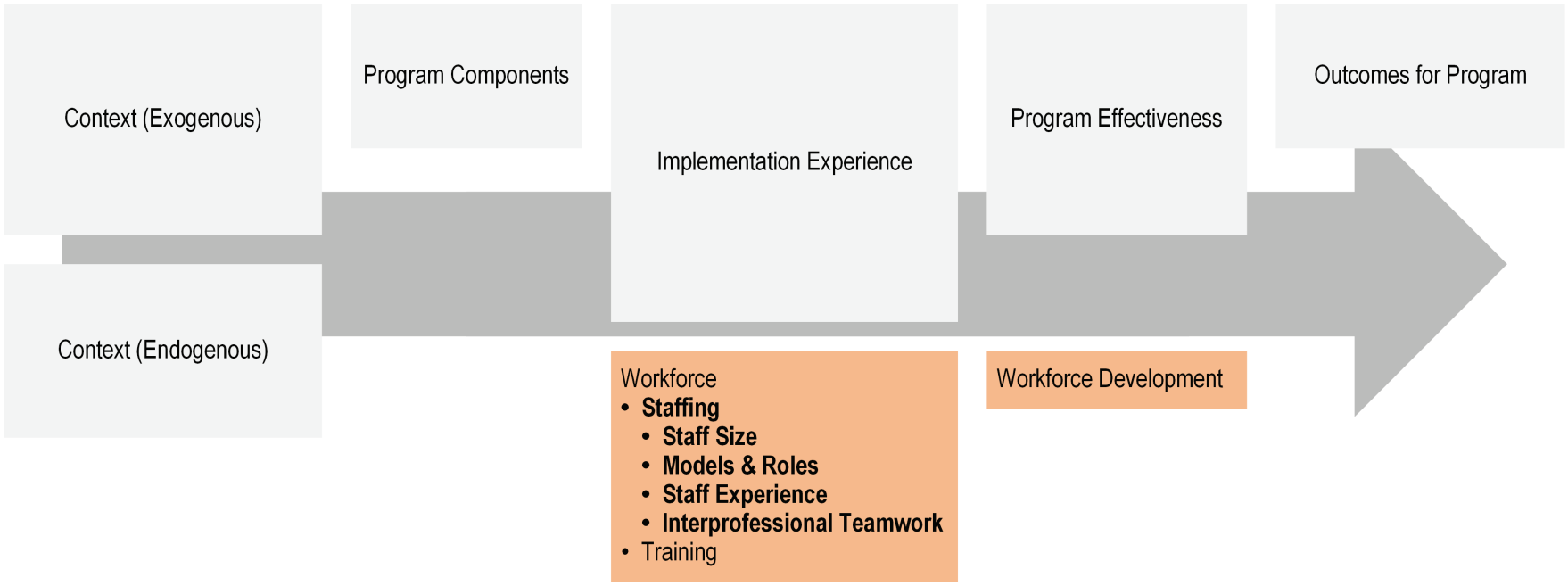
Exhibit 5.1: Workforce Development: A Visual Guide



Staffing

In addressing workforce transformation and development, most awardees reviewed, and often changed, the roles and workflow of existing staff. In addition, they incorporated new roles, often adding non-clinical staff or specialists to care teams. In this section, we present an overview of awardees' staffing, including number of individuals, full-time equivalents, and roles, followed by theme-based findings on staffing, including recruitment, retention, and inter-professional teamwork; see Exhibit 5.2 for a visual guide.

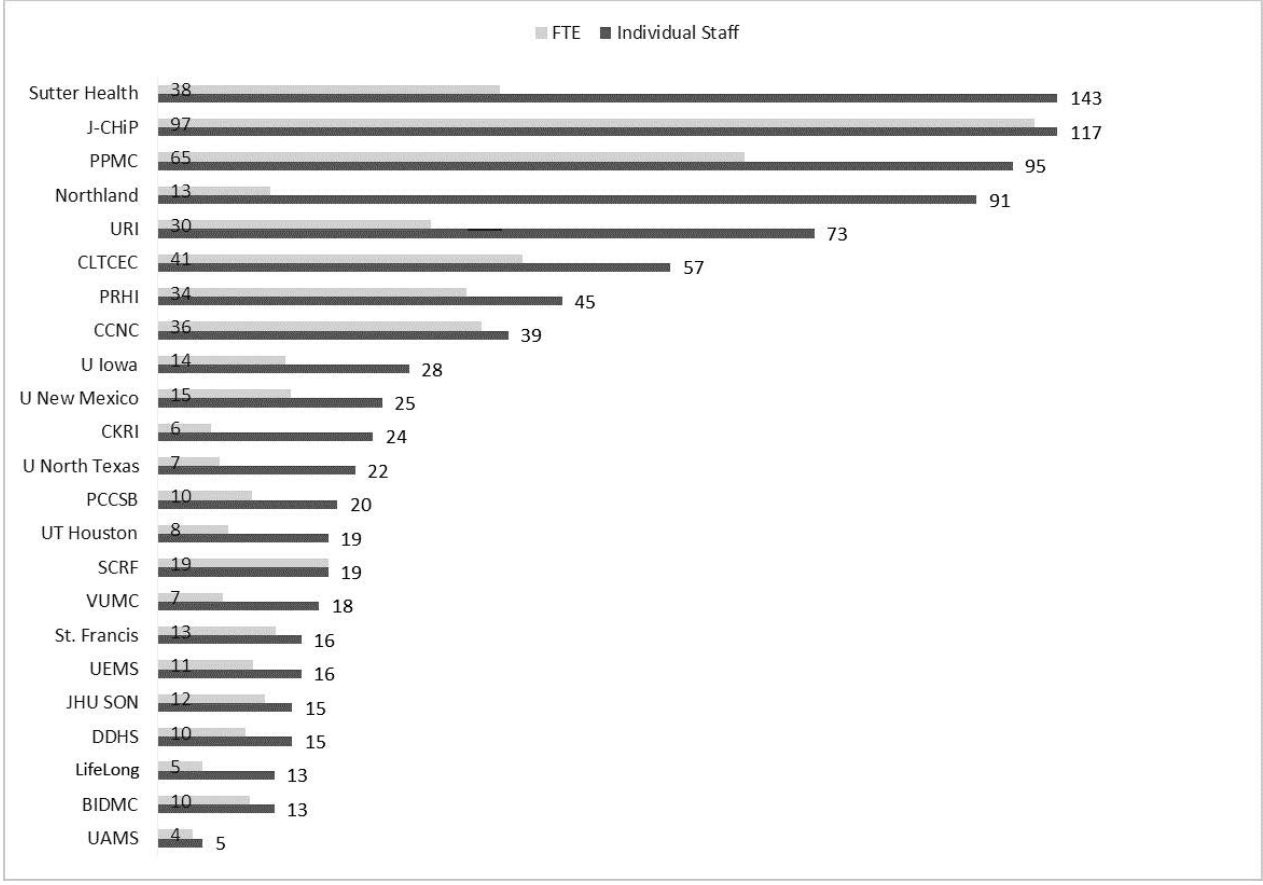
Exhibit 5.2: Staffing the CHRPT Interventions: A Visual Guide



Staff Size

Size of staff is one measure of organizational capacity. Awardee self-reported data for the eleventh HCIA reporting period provides two snapshots of staffing numbers—the individual count of staff and the number of full-time equivalent (FTE) staff (Exhibit 5.3).[30]

Exhibit 5.3: Number of Staff, Individuals and Full-Time Equivalents, as of HCIA Reporting Quarter 11



NOTE: Bars depicting number of individual staff for Sutter Health and J-CHiP are not proportional to other bars in the diagram.

- Eleven awardees report having approximately 20 or fewer employees serving in their respective interventions. Five awardees report having between 20 and 40 full or part-time staff, three awardees report having between 40 and 80 full or part-time staff members, and four awardees, between 80 and 150 staff (Northland, PPMC, J-CHiP, and Sutter Health).

[30] These data are awardee self-reported data submitted to CMMI and transmitted by the HCIA technical assistance contractor. NORC cannot confirm the accuracy or reliability of these counts. For example, NORC's site visit team notes a discrepancy in the count of 91 individual staff for Northland. One possible explanation for part of the apparent discrepancy could be that IDT members at each of the seven Northland sites are included (approximately 4-6 members at each site).

- These reported numbers alone may not accurately or meaningfully reflect the experiences of teams in the field, as the counts of staff and trainees do not appear to be consistently defined or reported across the awardees.
- Most of the awardees report 20 or fewer FTEs, with five awardees reporting between 20 and about 40 FTEs, and two awardees reporting between 60 and 90 FTEs. For some of these awardees (CKRI, U North Texas, Northland, and Sutter Health), a high number of staff corresponds to a small number of FTEs, indicating that much of the staffing is less than fulltime, while four awardees with larger staffs report their workers are fulltime (J-CHiP, PPMC, CLTCEC, URI).

The self-reported data presented in the awardees' quarterly reports to CMMI do not allow us to distinguish whether the staff counts represent new hires by the awardee (and if a newly created position is filled subsequent to the first hire to occupy the position), or whether a hire is internal to the awardee's organization, with salary covered by HCIA post-launch.

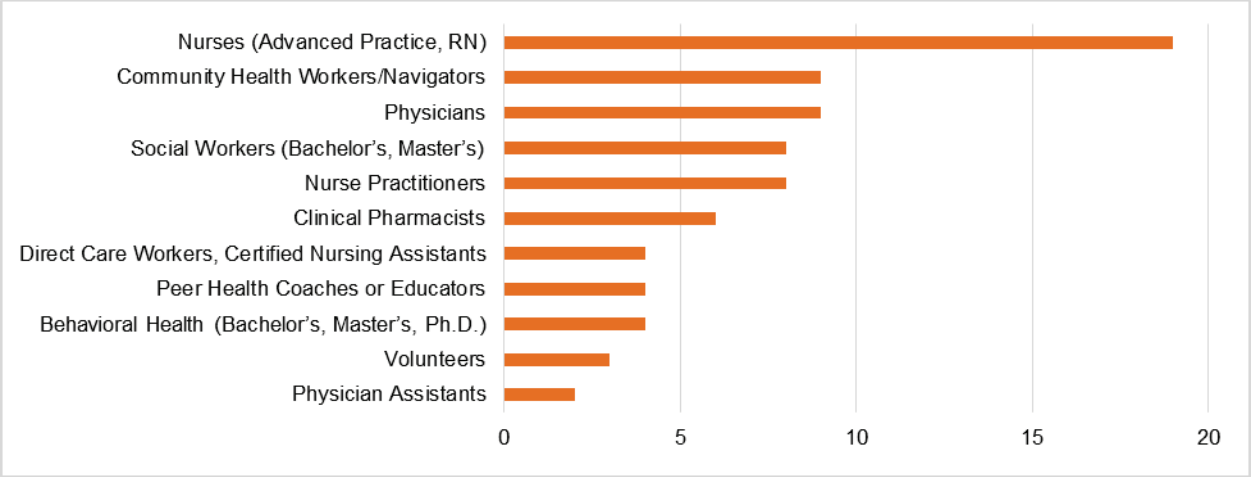
Roles and Models

The scope of practice and delineation of responsibilities varies for both licensed clinical, unlicensed, and nonclinical staff among the 23 awardees. Although professional training, certification, and licensure designate basic roles within health care settings, and in the provision of health services and long-term services and supports (LTSS), the premise of the HCIA programs is to redesign service delivery models using clinical and nonclinical staff in new ways to make care both more efficient and more effective in improving patient outcomes. Thus, physicians, nurses, nurse practitioners (NPs), physician assistants, pharmacists, social workers, psychologists and other mental and behavioral health specialists, and nursing and personal care assistants are frequently performing new activities and functioning in ways that expand upon their traditional roles. Many HCIA awardees also use community health workers (CHWs), patient navigators, peer health coaches and educators, and volunteers to perform tasks highly specific to their particular interventions and target population. Exhibit 5.4 displays the frequency with which awardees employ different kinds of workers.[31]

- Almost all awardees employ advanced practice nurses (e.g., nurse practitioners) or RNs (19).
- Aside from nurses, the next most common categories of staffing include physicians (9 awardees) and community health workers/patient navigators (9 awardees).

[31] The data on which these counts of staff by category are based on multiple sources, including awardee self-reported data in quarterly reports to CMMI and NORC telephone interviews and site visits. We do not have consistent information from awardee to awardee on whether some or all of the staff in each category are paid in part or wholly by HCIA funds.

Exhibit 5.4: Number of Awardees Using Category of Staff*



NOTE: *These classifications are mutually exclusive.

The HCIA meta-evaluation offers a more general perspective on staffing, grouping the professional roles into categories defined by function, as follows:[32]

- *Licensed independent clinical practitioners* involved with diagnosis, treatment, and oversight of care: Physician, physician assistant, nurse practitioner, clinical psychologist.
- *Licensed clinical staff*, not practicing independently: Pharmacist, dietician, social worker, health educator, registered nurse, licensed practical nurse, physical therapist, occupational therapist, paramedic.
- *Non-licensed clinical support staff* with direct contact with patients, usually under supervision of licensed staff. Technician, direct care worker, benefits counselor, peer counselor, health coach, patient navigator, community health worker.
- *Non-clinical staff with no direct patient contact*. Administrators, project managers, data analysts.[33]

Using these categories, licensed clinical staff is the largest group, with 370 employees, and that with the lowest number of staff is licensed independent clinical practitioners, with 63 employees. All awardees employed non-clinical staff, making it the second largest category with 335 employees. See Exhibit 5.5 for a summary of staffing by function for each awardee, based on awardee self-reported data for HCIA Reporting Q11 (January 1 through March 31, 2015).

[32] These are awardee-reported numbers, collected from the Lewin reports. Awardees may be using larger workforce universes in their counts.

[33] Appendix E, Staff Type Categorization, page E-2 in HCIA Meta-Analysis and Evaluators Collaborative. Quarterly Report Appendices Quarter 1 (Research Triangle Park, NC: RTI International, 2014).

Exhibit 5.5: Staffing Categories by Function, by Awardee, as of HCIA Reporting Quarter 11

	Licensed independent clinical practitioners	Licensed clinical staff	Non-licensed clinical support staff	Non-clinical staff
BIDMC		10		3
CLTCEC*		1	16	40
CCNC	1	36		2
CKRI	1	3		20
DDHS	5	4	3	3
J-CHiP	6	55	30	26
JHU SON		8	2	5
LifeLong		5	3	5
Northland	12	51	10	18
PCCSB	10	5	2	3
PRHI		23	6	16
PPMC	5	25	30	35
SCRF		12		7
St. Francis		10		6
Sutter Health	1	92	7	43
UEMS	2		7	7
UAMS*			1	4
U Iowa	6	11		11
U New Mexico		1	10	14
U North Texas	1	3		18
URI**	4	9	10	33
UT Houston	9	1	2	7
VUMC		5	4	9
totals	63	370	143	335

NOTES: *These interventions consist of training for direct care workers. **URI had 17 staff described as "other."

In designing their staffing strategies to best accomplish their goals, awardees considered both traditional and new roles for their workforce. The following examples outline some of the prioritized roles, by intervention key task.

Coordination of Care. Most awardees implemented some form of coordination of services. Registered nurses, advanced practice nurses, and NPs typically serve as care managers, transition specialists, or as the lead member of a multidisciplinary primary care team. Despite differences in program types, this care coordination role is markedly similar among awardees. Nurses are tasked with ensuring that the information needed to provide the patient cohesive care in transitioning between providers or across sites of care, such as from hospital to SNF or home, is conveyed effectively through "warm handoffs."

Most of the awardees that focus on care transitions following a hospitalization also employ pharmacists to conduct medication reconciliation prior to discharge and to communicate directly with the skilled nursing facility (SNF) or primary care practitioner (PCP). Pharmacists, occasionally assisted by pharmacy assistants or technicians, also provide patient (and family caregiver) education and counseling in the hospital setting and in team-based primary care interventions, where they sometimes make home visits to patients who take a large number of medications. For these patients, polypharmacy puts them at risk for

adverse events and hospitalizations. A pharmacist may be able to recommend a reduced and safer prescription regimen for the patient.

Deliver Care and Redesign Clinical Workflow or Process. The formation of inter-professional care teams has reshaped care delivery and clinical workflows for a number of awardees. These teams often include both clinical and non-clinical staff (e.g., CHWs, peer educators, or dedicated administrative assistants). Incorporation of non-clinical staff into the team facilitates patient communication and documentation for care management, preserving clinicians' time for clinical decision-making, training, and hands-on patient care.

Two awardees, VUMC and U North Texas, have implemented the evidence-based care management tool, INTERACT, in LTSS settings. INTERACT not only provides a framework for nursing staff to communicate with clinical decision makers (physicians and NPs) and across settings (from SNF to hospital and vice versa), it also elevates the role of the nursing assistant in SNFs, and of personal care and ancillary staff in assisted living settings, by providing them with training and a documentation tool, Stop and Watch[34], to record and convey information to nursing staff about often subtle changes in a patient's or resident's condition that may be clinically significant. Sutter Health's Pillar-Focused Care Note is a similar tool that facilitates communication. J-CHiP and its five partner SNFs, through monthly collaborative meetings, developed general transition protocols as well as disease specific protocols for patients with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD) and delirium. While each SNF uses the protocols a little bit differently, in order to fit the needs and circumstances of their facility, these monthly meetings and protocols have greatly improved patient transfer related communication between Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center, and the partner SNFs.

Engage Patients and/or Caregivers. HCIA awardees emphasize self-management for patients, the setting of personal goals, and advocacy on the part of both patients and their caregivers to improve their experience within the health care system. Staff in virtually every clinical and non-clinical role are involved with engagement: practitioners, nurse care coordinators and transition specialists; pharmacists; behavioral health specialists; social workers; health resilience specialists (a position defined and developed by PPMC); CHWs; ED guides; and peer educators. Related training often includes motivational interviewing, how to develop patient-centered plans of care, and eliciting and working on goals articulated by the patient.

Referral to Community Resources. Many patients with complex conditions who are frequent users of ED and inpatient services have unmet subsistence needs that are at the root of, or that exacerbate, their health problems and the instability of their conditions. Many awardees employ licensed clinical social workers or CHWs to connect patients and their families to basic resources and services, such as housing, transportation, food subsidy programs or food banks, and pharmaceutical discount programs. Across a range of interventions, from comprehensive care for medically fragile children to facilitating transitions

[34] http://interact2.net/ .

from hospital to home, awardees have voiced the importance of this service and a need for more staffing to address social service needs.

Improve Clinical Decision Making. In contrast with the ubiquity of care coordination and workflow redesign initiatives among the awardees in this portfolio, only a few have explicitly undertaken educating and supporting PCPs in the latest evidence-based clinical practices and improved clinical decision making. CCNC, U New Mexico (ECHO Care), and PRHI have created programs that aim to provide PCPs with up-to-date information about clinical care pathways or guidelines. The North Carolina and ECHO Care programs have established consultative relationships for PCPs with specialists at tertiary care centers. CCNC serves children with highly complex medical conditions across the state and ECHO Care places Outpatient Intensivist Teams (OITs) in communities that have concentrations of younger Medicaid adults who are high utilizers of ED and inpatient services, many with substance abuse or mental health problems. Through the training PRHI provides to Primary Care Resource Center (PCRC) staff located in six community hospitals in Western Pennsylvania and West Virginia, best practices in the care of patients with chronic obstructive pulmonary disease, cardiovascular disease, and congestive heart failure are shared with PCPs who refer patients to their local hospital.

The expertise of consulting pharmacists also enhances clinical decision making in both inpatient and outpatient settings. For those awardees that employ pharmacists as care team members, medical residents and PCPs reported to NORC that they valued the pharmacist's depth of knowledge about therapeutic alternatives and advice in prescribing for their complex patients.

Training Direct Care Workers. Three awardees (CLTCEC, UAMS and SCRF) offer training or support for personal care assistants who provide direct care to frail elders or persons living with disabling conditions in their homes. CLTCEC and UAMS use a train the trainer technique to disseminate their curriculum through a qualified instructor staff. Certification or training requirements for this position, often paid for by Medicaid, vary among the states. The State of Arkansas, for example, has recently enacted a training requirement for in-home caregivers whose services are funded by Medicaid. In contrast, the state of California imposes no training requirements for in-home caregivers paid for by Medicaid through the statewide In Home Services and Supports (IHSS) program. Recruitment and attendance for training direct care worker courses requires continued attention by the awardees, since many potential participants have experience in the position and may not see the immediate need for formalized education. One of the objectives of these training programs is to bring the direct care worker into communication with their client's health care providers, and with the client's permission, to allow the direct care worker to participate in their client's health care team. Direct care workers have the advantage of frequent, if not daily, contact with their clients and, with the proper training, orientation, and tools, can be effective observers and support their clients' appropriate use of services, such as discerning a medically relevant change in condition that merits a visit to the PCP, which in turn may forestall an unnecessary ED visit.

Staff Experience: Recruitment, Retention, and Satisfaction

In this section, we provide thematic analyses of the primary data collected on the three major components of staffing—recruitment, retention, and teamwork. We also include preliminary results of surveys, when available, that echo the themes found in the qualitative data.[35]

Findings: Recruitment and Retention

- Many awardees sought seasoned staff, whose experience is often credited as contributing importantly to successful implementations. Hires are often mid-career, with experience across a number of care settings (e.g., clinical, community, long-term care or adult day care, management, administrative). A number of awardees hire internally, especially when preparing for the initial project launch or when rolling out additional sites for a multi-site intervention. Where outside hires have been made, awardees have noted the administrative challenges of recruiting externally (e.g., hiring, orientation, probation period) and of integrating these staff into the organization and culture. As awardees have developed and refined which populations they target, they also have also refined what types of staff to hire. Tight labor markets, especially in underserved rural areas, result in awardees competing for new hires with the skill sets that they need or that job tasks are revamped, in order to be able to fill a position. While the HCIA programs created and staffed new positions, these positions were frequently filled by professionals who were already employed by the organization or site hosting the new intervention.[36] In a number of HCIA-funded programs, awardees have supplemented the new staffing afforded by the award by contributing in-kind staff to implement their interventions.
- Finally, virtually all HCIA programs faced the inherent recruitment challenge of time-limited funding for new positions and services due to the three-year HCIA awards. In some cases, in order to attract and retain experienced staff, awardees guaranteed staff a post-HCIA position within the organization if they accepted the HCIA-funded job offer.

Lessons Learned: Recruitment

*Determine an appropriate and competitive compensation package***.** As with many job positions, some recruits did not find the compensation at the level they thought it should be. Others felt the workload seemed to outweigh the pay. Competitive salaries for data base administrators and some specialist staff (such as health behavioral specialists) were higher within certain markets than the awardee had anticipated and budgeted.

Recruitment of staff with specialized skills may be difficult. When trying to fill specialized positions, such as those that require experience with complex pediatric populations or bilingual personnel, recruiters said it was difficult to find a pool of qualified candidates. Likewise, when recruiting for nurses it was harder to

[35] As of August 2015, we have completed preliminary analyses of five workforce trainee surveys designed and administered by NORC, for CCNC, PPMC, PRHI, Sutter Health, and UAMS. In addition, we have preliminary findings related to workforce from surveys conducted by CLTCEC and U New Mexico. We anticipate presenting more comprehensive analyses, as well as findings from additional workforce surveys, in subsequent reports to CMMI.

[36] A related issue concerns the impact of HCIA-funded projects on local and regional economic development. While our evaluation does not touch directly on this question, we expect to present some findings on this subject in subsequent reports to CMMI.

find those who had experience with community services. For J-CHiP, when they were looking to increase their technical workforce, they found that "there is a small pool of applicants that have shovel-ready experience to do this kind of work." When recruiting nurses, LifeLong found that "It's a difficult thing to transition to working in the community and stand up for the independent living principles." The data suggests that finding workers with special skills will require longer and wider searches, as well as additional training to prepare them for expanded roles.

Work environment matters. Whether it was the geographical location (e.g., the facility was located in a remote or a rural location, or the fast-paced culture (e.g., a stressful ED department), the location of the job can affect its attractiveness to potential applicants. For example, Northland found that "Staff recruitment is challenging in rural areas" and a staffer at UEMS commented that "The ED is not a place for me; too much pain and suffering." Supply and demand principles apply to health care worker markets, particularly related to the location of the position.

It is important to find a suitable candidate that is a good fit. Specific positions, like working with the elderly or those with addictions, require a good match. For example, a JHU SON staffer reports that their team is really very special and "love[s] older adults and get along well – you can't control that everyone will love older adults; some people may just not want the job." At U New Mexico, they report being affected by turnover because "these are tough people to take care of unless you have the support." It can be difficult to find people who are committed, compassionate, skilled, and who understand the needs and care of a specific population.

Create an attractive employee referral program. Paying employees a stipend for referring other good qualified candidates benefits the institution, the current employee, and the new recruit. For example, using institutional funds, J-CHiP "developed a referral and retention program, giving workers an increase for referring other people to the position." Employee referral initiatives may increase the pool of qualified applicants.

Communicate the benefits of the program and employees' opportunities for professional growth. Attractive programs provide employees with good training and support networks. It is important to advertise the full array of job benefits. At JHU SON, for example, a candidate shared that "The education part was important to me…really grabbed my attention," and at URI "outreach coordinators in centers, job coaches and job developers, and benefits counseling in centers" were seen as important. To attract strong candidates in a competitive job market, employers should convey the benefits of the program and opportunities for professional growth, such as training and education for new roles.

Be flexible and adapt to evolving staff needs. Sometimes what is originally proposed for staffing strategies does not work well when implemented, so awardees need flexibility to make mid-course adjustments to their workforce plans and composition. For example, at CCNC, the steering committee proposed using veterans for patient coordinators but later found "it was a great idea on paper, but not in practice." Awardees are learning about staffing requirements as the interventions mature; new information leads to new strategies.

Lessons Learned: Retention

Guard against burnout. Overwhelming time demands create frustration and resentment. If programs are understaffed, staff can become overburdened and eventually burnout and leave. One UEMS worker explained, "It is very hard to do this…I would like to continue to be involved in a capacity, but not taking over my life," and another commented, "…there is stress about calling in if you need [time] off...there is not anyone available sometimes." High stress work environments, such as EDs, require management to implement strategies to mitigate stress to retain high performing staff.

Plan for transitions at end of grants. Due to the nature of the limited time allotted for program funding, transitioning valued employees to permanent positions requires advanced planning. An employee may follow a leader that leaves when a grant ends or a facility is sold to a new operator. For example, JHU guaranteed J-CHIP staff a post-award position. To successfully launch a program with time-limited funding, it is important to convey to staff that a plan is in place to sustain their positions afterwards.

Establish a positive work environment. The work environment influences the workers' perception of their jobs. For example, sometimes the work environment itself is a challenge. At UEMS, an ED employee described it as "uncomfortable" and planned to leave. At U North Texas, an employee regretted that staff "can't have personal relationships with the patients," and considered becoming a volunteer instead, in order to be able to take their client out for coffee.

NORC survey findings include data on satisfaction with work environments, which varied across awardees, with 96 percent of respondents at PRHI being satisfied or very satisfied, followed by 83 percent at CCNC, 76 percent at PPMC, and 65 percent at Sutter Health.

Create support networks for staff. Those employees who have support networks that include programs such as shadowing and mentoring, are more likely to be satisfied and to remain in their positions. Support, regardless whether it comes from administrators, medical personnel, or peers, encourages retention. At PCCSB a nurse commented that even though she is stressed, she feels "lucky to have this job" as she gets "so much support from doctors…I am a better nurse." Sutter Health learned that, to improve retention, they need to develop a "social work facilitated support group" that would address challenges, coping strategies, and "how to support one another."

According to survey data from U New Mexico, most respondents report feeling supported and respected as part of the ECHO Care team. Seventy-three percent (73 percent) of respondents reported being connected to peers for professional advice and consultation. Respondents felt supported both by their supervisors (73 percent) and fellow Outpatient Intensivist Team members (87 percent). A total of 77 percent felt their team members understood and valued their contributions. These findings are comparable to findings from NORC's four workforce trainee surveys for other awardees (CCNC, PPMC, PRHI, Sutter Health).

Ensure access to other professional services and resources that clients need. Related to the emotional and technical support that programs offer is the availability of other services and resources to meet the needs of patients and clients. Clinicians and care coordinators need access to specialists and pharmacists and resources throughout the community. At J-CHiP, CHW's "know every resource in the city." At PPMC

one new recruit mentioned, "One thing I found valuable was giving me a mentor who had been doing the job for quite a while and was not my supervisor."

Allow for autonomy. To thrive, workers need to feel some control over their work. Many staff cite independence as a crucial and highly valued feature of their role in the innovation. Recurring through many of the responses were statements that attractive positions had (as cited by DDHS and St. Francis employees), "independence and responsibility" and "autonomy." Survey data corroborated these findings, as most respondents to the workforce surveys (CCNC, PRHI, PPMC, Sutter Health) reported satisfaction with the level of autonomy in their role. Empowering staff enhances job satisfaction.

Highlight the meaning of the work. To feel that their work is worthwhile, employees need to view it as meaningful. For some staff, meaningful work encompasses personal involvement with patients that allows for quality relationships. At PCCSB, an employee remarked that "relating to patients and hearing their stories is rewarding. It's an additional reason we are there." A J-CHiP employee related that "one wise person said that if it's not about a relationship, it's not about anything." According to the PRHI and CCNC survey data, 62 and 69 percent of respondents, respectively, indicated that their role on the project was highly rewarding while 47 percent of PPMC and 48 percent of Sutter Health respondents indicated that their role was highly rewarding. Almost all respondents across the four awardees said their role was at least moderately rewarding. An organizational culture that values and considers staff contributions as intrinsically meaningful contributes to employees' perceptions of reward.

Inter-Professional Teamwork

Almost all CHRPT interventions include care coordination, which is typically carried out by teams. In our first annual report, we highlighted initial observations about inter-professional teamwork, noting that

- Awardees modify existing, evidence-based staffing models (e.g., PACE, ABLE) as well as create their own new models.
- Tasks held in common across interventions may be staffed differently from awardee to awardee: for example, assigning an RN to patient navigation in one program what might be assigned to a community health worker in another, or training teams to implement versions of INTERACT but varying the staff composition of these teams.
- Teams may be comprised solely of clinical providers, of clinical and non-clinical staff, or of health care practitioners collaborating with staff from other fields, such as social services and disability rights.

See Appendix Exhibit E.7 for summary of awardee approaches to inter-professional team constructs.

With the benefit of coded primary data from NORC's two waves of site visits and awardee telephone interviews, we offer additional observations that illustrate the breadth of awardees' experiences with multidisciplinary teams.

Findings

- Many awardees deliver *team-based care*, defined by AHRQ as "care delivered by intentionally created, usually relatively small work groups in health care…having a collective identity and shared responsibility for a patient or group of patients" (AHRQ, TeamSTEPPS)[37]. In addition, a small number of awardees that (under AHRQ's definition) are engaged in less tightly knit teamwork, or "cooperation among different health professionals."
- Seventeen awardees use RNs to lead one or more of their teams, and NPs play leadership roles in three interventions that involve clinical workflow redesign (DDHS, U New Mexico, UT Houston). For two interventions focused on training direct care workers (personal care aides or paid caregivers), the client is designated as the team lead (CLTCEC, SCRF).
- Fourteen awardees create teams that bring together clinical and non-licensed staff, with the latter either CHWs (J-CHiP, PPMC, UEMS, U New Mexico), patient navigators (CCNC), or peer educators or coaches (CKRI, LifeLong, URI). For the two awardees implementing modifications of the INTERACT quality improvement tools (U North Texas, VUMC), teams include a broad range of licensed and non-licensed staff at participating skilled nursing and other residential care facilities. A subset of awardees also bring clinical and non-clinical staff together with practitioners from fields such as social services and disability rights advocates.
- Ten awardees field teams that work together at the same location (based at hospital, clinic, or home), ten awardees have teams that work at different locations (e.g., using cell phones, tablets or other means to communicate), and three have teams where type and frequency of contact among team members varies by task.

Lessons Learned

Expect challenges when integrating hospital and community providers. Workers outside the hospital expressed frustration and stressed the value of being included and integrated into the medical facility. The "culture clash" between the medical care inside the hospital and the community social services outside needs to be bridged for optimal patient care. At U New Mexico, communications between multi-disciplinary teams that include CHWs and hospital-based specialists has "gotten a lot better. There were different world views before, lack of respect and tolerance [but] they [ECHO Care staff generally] have done a lot of work." At UEMS, challenges were expressed as "a lack of respect for the CHW staff in the ED" and "someone at the top needs to put us in the flow."

Encourage effective communication between health care and social service personnel. Respondents stated that they wished there was more communication, both orally and with the sharing of written information between inside and outside personnel, especially when a crisis occurs. At UEMS, employees commented that there is "not as much dialogue as we would like" and they would also like "more dialogue with PC docs." At VUMC it was noted that the "hospitals don't know how much [SNF staff] know," so the "ability to share data back and forth is very powerful." The qualitative data suggest that access to, and sharing of, information is essential.

[37] For more about TeamSTEPPS, see http://teamstepps.ahrq.gov/ .

Manage patient information access and dissemination. One key to success is to facilitate bidirectional information sharing among the health care team and patients. Having shared records and data facilitates communication and improves team dynamics, and ultimately benefits patient care. U Iowa leaders suggested, "One key role to successful outcomes: Managing information. Communicating across space, disciplines, entities, admissions, and providers. Sharing data in both directions." BIDMC also observed that, for the hospital-based team members and ambulatory clinic staff, "having the shared medical record and open communication…really helped to optimize points of contact."

Build collaborative networks. For optimal functioning, it is important to coordinate health care services with social services. When viewed as a team and working collaboratively, patients and staff benefit. At U Iowa, teamwork was noted: "we definitely want to make sure that the right people are doing the right work, but occasionally that needs to blend." At BIDMC, collaboration was summed up as "it really brings as sense of "we're all in this together, not just separate inpatient/outpatient worlds." Most U New Mexico staff survey respondents (96 percent) reported that the ECHO Care team is committed to working together to provide good patient care. Open-ended responses capturing the drawbacks and benefits of working closely with other members of a patient care team acknowledge the advantages of working on a team with diverse backgrounds and the ways in which collaboration leads to improved patient care, as well as to personal growth. Furthermore, about 95 percent respondents to all four NORC workforce surveys (PRHI, PPMC, CCNC, and Sutter Health) indicated that working in collaboration with a team had a positive or very positive impact on the quality of care that patients receive.

Maintain and encourage mutual respect and cooperation. As with any team, working together for the same goal encourages good work and improves the likelihood of success. While there are different priorities, skills, and jobs on the team, leadership should encourage a supportive collaborative atmosphere. At JHUSON, the teamwork "functions well" and "everyone is so dedicated and excited;" they feel they "are doing good work, and that drives everyone and brings us together."

Training

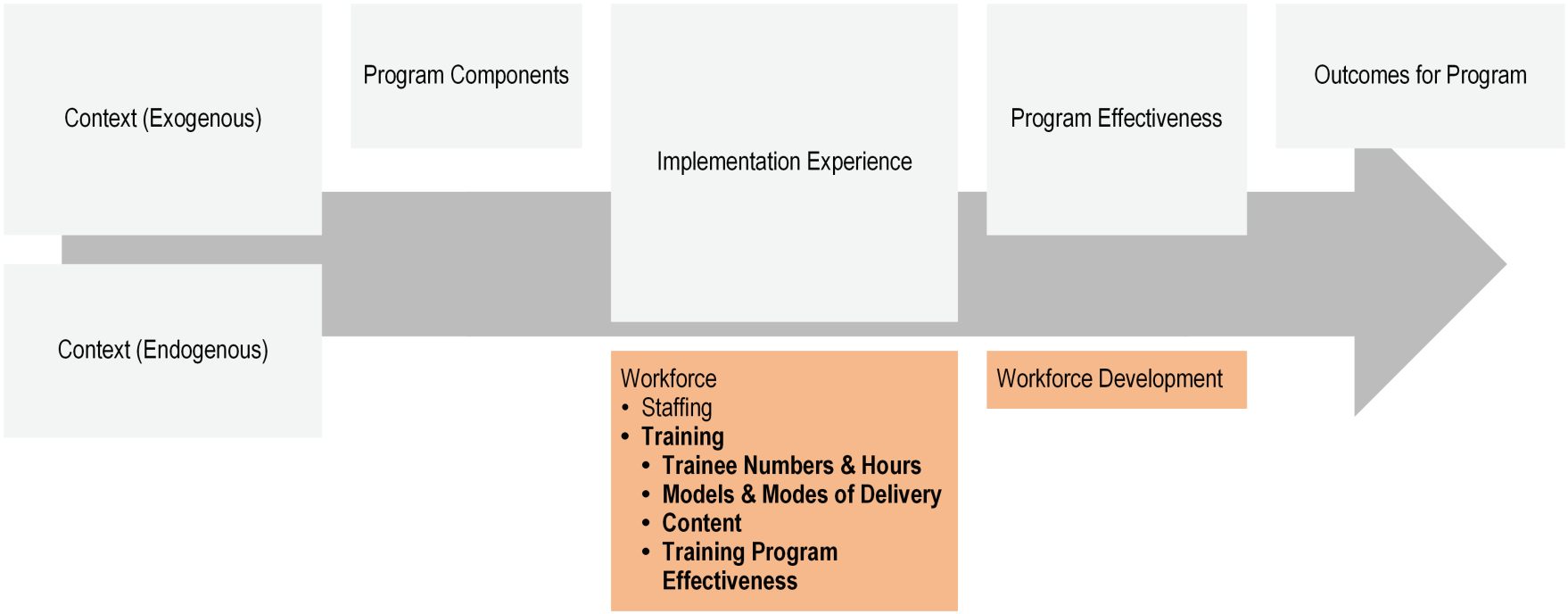
Staff training is integral to many of the 23 awardee interventions in the CHRPT portfolio. Training must have the right content, be targeted to the appropriate staff members, include the new and innovative behaviors, knowledge, skills, and attitudes, and reinforce patient and family empowerment. Many of the awardees share an overlapping set of objectives for their interventions' training programs, including:

- orient new employees
- improve skills and competencies of existing employees
- help employees adopt a specific practice, new process, or intervention
- help employees successfully transition to new roles with new responsibilities
- help employees work effectively in new environments/clinical settings; and
- help employees work effectively as members of interdisciplinary teams.[38]

In this section, we present trainee numbers, training models and modes of delivery, and training content, followed by theme-based findings; see Exhibit 5.6 for an overview.

[38] HCIA May 15, 2014 All-Awardee Webinar. Summary Report. Workforce Development.

Exhibit 5.6: Training to Support the CHRPT Interventions: A Visual Guide



Trainee Numbers and Hours

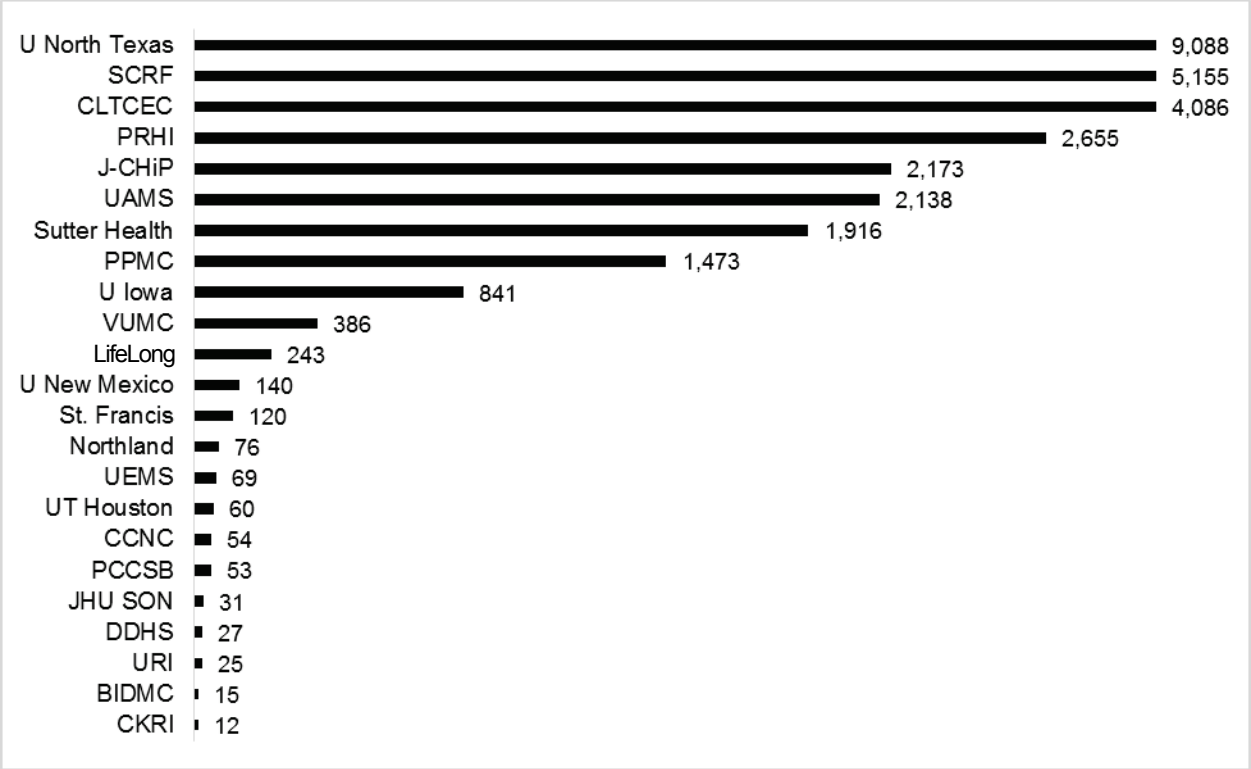
Cumulative counts of the numbers of trainees and of trainee hours provide rough estimates of the size and scope of awardee staff training efforts.[39] With the understanding that NORC cannot confirm that the awardees' quarterly reports consistently present statistics on training, we make the following preliminary observations:

- Nine awardees report training over 500 staff. For two (CLTCEC, UAMS), training is the core activity of their HCIA intervention and it is not directly comparable with staff training reported by other awardees. The rest provide training to staff at multiple sites or arms of an intervention (J-CHiP, PPMC, U North Texas), and they are training more than one type of dedicated staff role.
- Of the awardees that report training 250 or fewer staff, there is a division between single site interventions that train between 30 and 70 staff each (UEMS, PCCSB, UT Houston, JHU SON) and multiple-site interventions that take a lean approach, training smaller numbers of staff at each site (BIDMC, CCNC, DDHS, PRHI, URI, VUMC, Northland, U New Mexico).

Exhibit 5.7 provides a summary of the number of trainees by awardees since launch.

[39] The self-reported counts presented in the awardees' quarterly reports to CMMI do not identify whether a particular trainee has taken more than one course (e.g., an unduplicated count of trainees or the number of training hours per staff member), so these data do not allow us to document systematically the frequency or intensity of staff training. NORC cannot confirm the accuracy of these numbers, nor that awardees have consistently followed the reporting guidance issued by CMMI.

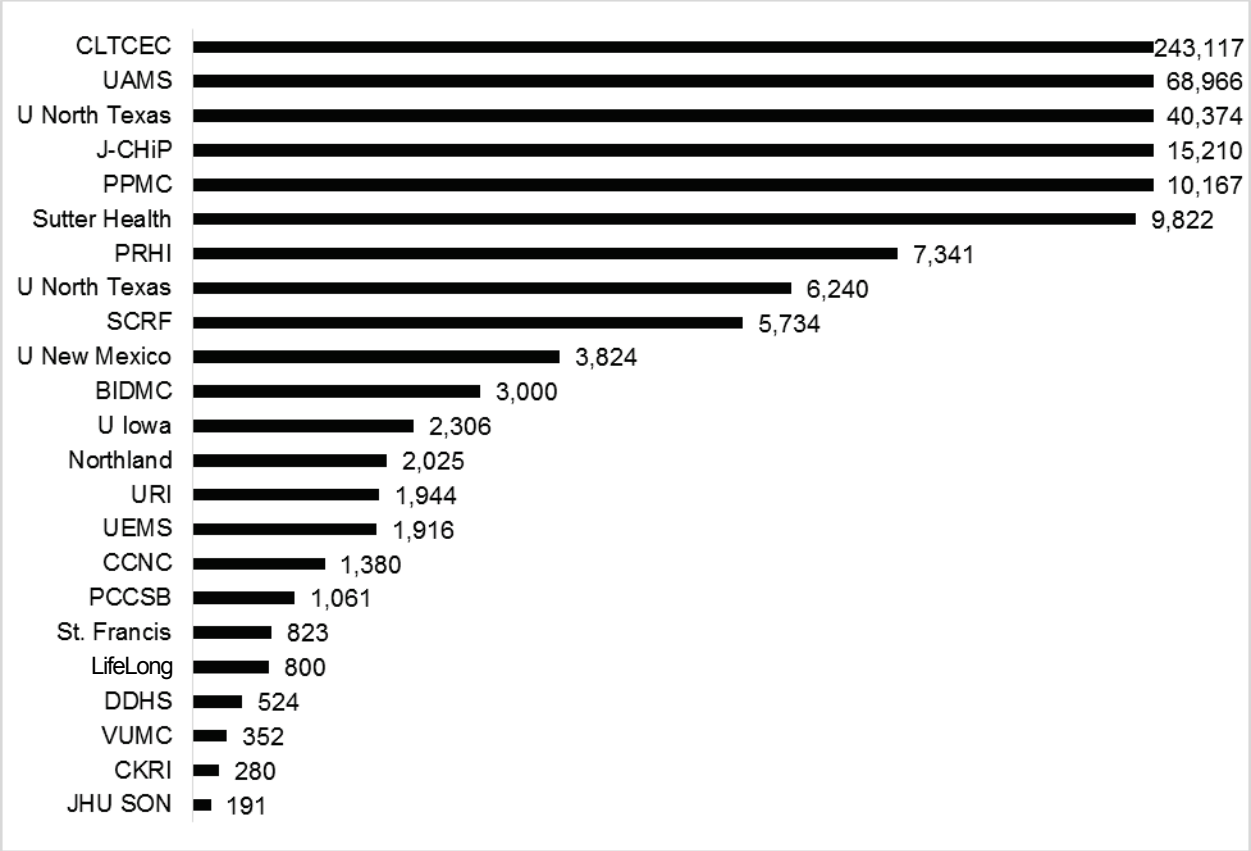
Exhibit 5.7: Cumulative Number of Trainees by Awardee, as of HCIA Reporting Quarter 11



NOTE: The bars for CLTCEC, U North Texas, and SCRF are truncated, rather than drawn to scale, to allow visual depiction of the range of values across the portfolio of awardees.

The cumulative number of training hours varies markedly—over three orders of magnitude—ranging from approximately 243,000 hours to just under 69,000 hours for the two interventions focused on direct care workforce training (CLTCEC and UAMS, respectively), to 191 hours for a one-site intervention (JHU SON). The scale of training hours may correlate with the formality of training approach, with greater numbers of hours reported by awardees with formal written curricula (J-CHiP, PPMC, UAMS) and relatively smaller numbers of hours reported by awardees that rely more on informal, experiential learning (St. Francis, LifeLong). Exhibit 5.8 summarizes cumulative trainee hours by awardee.

Exhibit 5.8: Cumulative Number of Training Hours by Awardee, as of HCIA Reporting Quarter 11



NOTE: Bars for CLTCEC, UAMS, U North Texas, J-CHiP, and PPMC are truncated, rather than drawn to scale, to allow visual depiction of the range of values across the portfolio of awardees.

Models and Modes of Delivery

The following outlines aspects of the training offered by our 23 awardees in support of their respective interventions:

- There is a range in the formality of training, with some awardees using a written curriculum, didactic classroom or web-based sessions, and competency-based testing (e.g., trainee to demonstrate mastery of new knowledge and skills, observation of new behavior as part of intervention implementation), and others relying more on an experiential approach to training, where new hires are assigned to a mentor or shadow to learn most of what they need to know to implement the intervention.
- For a given awardee, there is likely to be a change in approach to training over time, implemented months or even more than a year after launch, to improve the efficiency and effectiveness of training, usually by placing greater emphasis on experiential learning and eliminating some, or breaking up, formal coursework.
- For awardees with multiple sites, part of the implementation has involved developing a consistent approach across sites, both those that are part of the awardee organization and those hosted by partners. The degree of central program oversight varies, as does the approach.

In this section, we explore training models in greater depth, informed by data that NORC has collected to date. See Appendix Exhibit E.8 for a tabular summary of awardees by training model characteristics.

Formal Curriculum. Only a few awardees have exclusively curriculum-based training. Organization size may play a role in the decision to use standard courses as these interventions are generally being implemented on a larger scale, statewide, or between multiple regional sites. In fact, three of the four awardees who conduct curriculum-based trainings present them via webinar to various program sites. All of the trainings have a defined set of course modules to be completed during the classes. CCNC splits their training into three modules, each with a specific program focus, to address all relevant aspects of the intervention. Similarly, VUMC presents the INTERACT training in 11 modules, covering the various protocols and processes related to the intervention. Sutter Health shows a strong, sustained commitment to training, with a week-long, full day classroom orientation for its inter-professional teams, training preceptors assigned to each site, and competency testing 90 days following the training; much of the formal training is also made accessible through webinars.

Mixed Approach. A number of awardees take a mixed approach to staff training, incorporating both classroom courses and hands-on learning. Although course organization is similar among awardees, relying on structured curricula with discrete topical modules, the format of experiential training varies. For example, nurse care managers at LifeLong shadow more experienced colleagues to obtain their experiential training, while trainees at Sutter Health participate in weekly case conferences that allow them to prepare for their future roles and become more familiar with the patient population.

Experiential Learning. Very few awardees rely exclusively on experiential learning. This particular training model tends to align with interventions where trainees are already experienced clinicians in their fields and are only attending the training to learn about a new program or a unique patient population. Thus, the interventions focus on hands-on training experiences. PCCSB's rapid response nurses are trained through on-the-job experience and shadowing, and in addition, at weekly case conferences where didactic material is presented on the specific needs of the geriatric patient population. DDHS trainees undergo one-on-one clinical training to learn the specific treatment issues faced by patients with developmental disabilities.

Direct Care Workforce Training. The awardees whose interventions specifically train workers that provide hands-on care to patient populations with cognitive or functional disabilities use a variety of methods, including experiential, mixed, and curriculum-based training. Perhaps the most distinctive feature of these programs is the need to accommodate the relatively low level of educational attainment among direct care workers, whether in the home or as aides and nursing assistants in nursing homes or congregate living facilities. CLTCEC, SCRF, and UAMS have each faced the challenge of incorporating technical, clinical, and psychologically sophisticated content and skills in programs whose students sometimes have low literacy. CLTCEC in particular modified their existing teaching materials over the first year of training to better accommodate the learning skills and styles of their students.

CLTCEC's original course used a lecture format but this was revised after the first year, based on participant feedback during focus groups. Lectures were replaced with a more interactive approach that actively engaged the students through role-playing and group presentations. Notably, after the teaching

approach was changed to be more focused toward adult learning, both class attendance and course completion improved. In addition, CLTCEC actively involves the client (Medicaid beneficiary) in formal workforce training, requiring client participation in two of the 17 sessions.

SCRF and U North Texas have trained direct care workers as part of broader efforts to promote collaboration among home and facility-based care staff. SCRF has home care agency RNs facilitate patient-centered care planning at a participant's home with the active support of personal care aides; the aides receive training in classroom settings and are monitored by RNs during home visits. U North Texas trains the full range of non-licensed and licensed staff at Brookdale Senior Living residences to use the INTERACT communications tools.

Competency-Based Training. Eleven of the 23 CHRPT awardees include competency-based testing as part of training, to confirm the acquisition of specific skills, knowledge, and behavior through in-person observations, teach-back, or written examinations. One way to gauge the relative intensity or frequency of training for these awardees is to compare the numbers of training hours reported per trainee; for four of the 11 awardees, there appears at least 20 hours of training each (CLTCEC, UEMS, UAMS, U New Mexico). Since we are not yet able to validate the reliability of awardee self-reported data that form the basis for these estimates, these numbers are useful for considering the role and importance of competency-based training, to be explored in reports.

Content

The training and orientation of staff contain many common elements across the CHRPT awardees, including conveying the fundamental values and attitudes that motivate awardees' programs. In focus groups and interviews, we learned that trainees and staff members could readily articulate and interpret the mission of their program in a meaningful way. Most often, trainees and staff not only knew what they were learning and doing (i.e., how to function as part of a team, accomplish a warm hand off, activate a patient to achieve a change in behavior) but also why these skills importantly contributed to patient wellbeing, self-determination, and improved care. The remainder of this section discusses three general topics related to trainings: care coordination, patient and caregiver engagement, and improving primary care capacity to serve medically complex patients.

Care Coordination. Most awardees either identified care coordination as one of the primary objectives of their initiative or noted it as an indirect goal. Establishing explicit infrastructure for and lines of communication is a first step in coordinating care. Awardees have variously established their own case management systems and software (U New Mexico, J-CHiP, and PPMC) and adopted existing processes and tools (St. Francis, U Iowa, U North Texas, VUMC). Each of these systems requires training in documentation and rules for transmitting information to other internal or external providers.

Teaching staff how to coordinate care for a patient across transitions in setting and among different providers takes a combination of didactic and experiential training. In recruiting RNs or other professionals to provider care coordination, many awardees noted that selecting candidates with excellent listening and observational skills, as well as effective problem-solving skills, was a factor in success in the coordinative role. Several awardees commented on the benefit gained by training staff who had

previous experience working with the particular population the awardee was targeting, particularly if communication with the clients was otherwise difficult or challenging. While setting expectations explicitly and providing guidance in the form of training and communications resources (e.g., reporting formats and procedures, shared care management data bases) may be necessary conditions of success for a care coordinator, they are not sufficient. Several awardees noted in interviews with NORC that, over time, they learned to look for candidates for this role who were flexible and who could tolerate a certain amount of role ambiguity. These qualities of personality probably are important for professionals, trained in a particular discipline, to bring to any job that has unprecedented expectations and responsibilities, not just that of care coordinator.

Patient and Caregiver Engagement. Participant engagement is a central feature of most awardees' interventions. To teach staff how to engage or activate patients and caregivers, awardees rely on a combination of formal instruction (e.g., motivational interviewing, chronic disease self-management skills, information about the particular chronic disease or condition presented in the target population) and experiential learning (e.g., teach-back, role playing, train the trainer). Part of the art of eliciting greater participant engagement is being sensitive to the functional and cognitive limitations of the population served and to the burden on family and other unpaid caregivers, who share responsibility for managing the patient's conditions as well as navigating health care and home care systems.

Several awardees noted the importance of building a relationship of trust with their patients or clients in order to engage effectively with them. Some awardees that serve Medicaid beneficiaries observe that high utilizers of EDs and inpatient hospitalizations often had histories of trauma or were living in traumatically stressful situations such as being homeless. To serve these patients, PPMC has designed both a position (health resilience specialist) and a general training based on the principles of trauma-informed approaches to care and patient engagement.[40] Adopting the principles of trauma-informed care as a framework for relationships with patients generally has become a hallmark of PPMC's intervention.

Building Primary Care Capacity to Serve Medically Complex Patients. Awardees have approached the task of strengthening PCPs in their care of complex patients through a variety of approaches. These include establishing multidisciplinary care teams as well as more overtly pedagogic strategies such as disseminating clinical best practices, specialist consultations, and learning collaborative. Many factors affect whether new knowledge is adopted by users, and, if so, how quickly it is incorporated into daily practice. Some of these factors include how readily available the content is, how clearly it is conveyed, and how immediately applicable it is to routine tasks.[41] Several awardees, notably CCNC, PRHI, and U New Mexico, have made access to new knowledge and clinical best practices central to their interventions.

U New Mexico's ECHO Care designed a primary care intervention for complex patients, leveraging a successful model for remote specialist consultations launched a decade earlier. The statewide CHACC model that CCNC has built on North Carolina's existing primary care networks and infrastructure of pediatric specialty care to solidify the relationships and sharing of information between these two kinds of

[40] http://www.samhsa.gov/nctic .

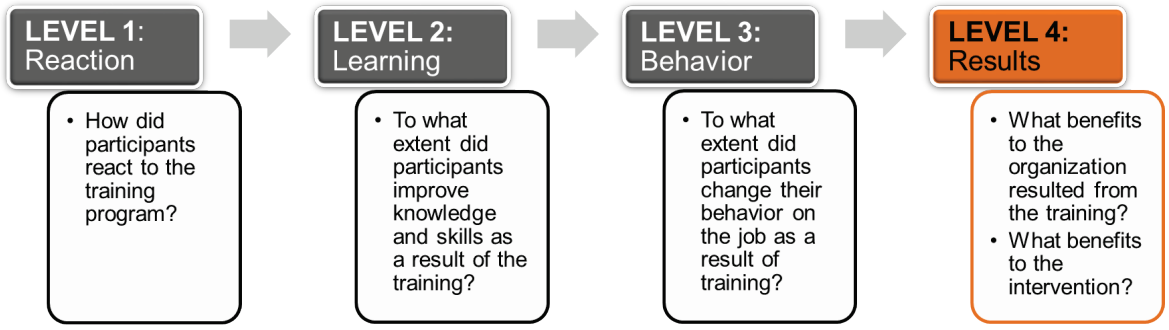
[41] http://www.quora.com/What-influences-adoption-and-utilization-of-knowledge-management-tools .

providers treating medically fragile children. CHACC aims to bridge existing gaps between current primary and specialty care services for more streamlined and integrated care, by refining clinical guidelines to ultimately enable the care management of clinically complex patients within a primary care setting, and with greater active involvement of family care givers.

Training Program Effectiveness

NORC's analysis of coded data highlights a number of major themes regarding training across the CHRPT cohort. The themes for training are organized following the Kirkpatrick Model.[42] This model directs our assessment to address the following: (1) how participants react to the training; (2) to what extent participants improve knowledge and skills as a result of the training; (3) to what extent participants change their behavior on the job as a result of the training; and (4) what benefits to the organization result, and in particular, what impact does the training have on core outcome measures? See Exhibit 5.9 for a diagram summarizing the Kirkpatrick model.

Exhibit 5.9: Kirkpatrick Model, Evaluating Training Program Effectiveness



Level 1: Participant Reaction to Training

Trainees appreciated learning new information. Many respondents found the training informative and helpful as the new information bolstered their interest and confidence. There was a high level of satisfaction reported as they found the courses equipped them to succeed in their new positions. A nurse in a CLTCEC focus group noted that "This has really upped my confidence. I have been doing this for 14 years but I never felt sure," and at J-CHiP they observed, "The training covers a broad spectrum of areas, and has been very informative. Our program has really been individualized. We have learned each other's weaknesses and bonded because this has been personalized." However, there were trainees that felt overburdened at work and found the time demanded by training, adding to their frustration.

Though there was some variation among the four NORC workforce surveys, respondents from PRHI, PPMC, CCNC, and Sutter Health generally felt that the training prepared them to implement the project as intended, use the technology they needed on the job, work with other healthcare providers as a team, and meet their patients' or clients' needs. Those who received informal training (via information

[42] Kirkpatrick, Donald L. 1994. Evaluating training programs: the four levels. San Francisco: Berrett-Koehler. See also "The Kirkpatrick Model," at http://www.kirkpatrickpartners.com/OurPhilosophy/TheKirkpatrickModel/tabid/302/Default.aspx, accessed 10/13/2014.

conversations as needed or shadowing) found them to be very useful. According to the survey data, 83 percent of Sutter Health staff thought the training was worth the time, followed by 82 percent at PPMC, 71 percent at PRHI, and 62 percent at CCNC.

At U New Mexico, most respondents agree (87 percent either agree or strongly agree) that learning to provide care for complex patients through the ECHO Care team increased professional satisfaction. Open-ended responses capture ways in which respondents feel they are benefitting professionally and highlight skills and knowledge gained and the opportunities this new information affords. Sixty-three (63) percent of respondents report feeling comfortable teaching patients what they have learned about diseases addressed in ECHO's Complex Care Clinic.

NORC's survey of UAMS trainees currently working as caregivers finds a markedly higher percentage who report themselves to be "very satisfied" with their caregiver training (91 percent), compared with members of a comparison group of caregivers not trained through UAMS (78 percent). This difference, which reaches statistically significance, narrows when considering those who report being somewhat or very satisfied, 98.9 percent for UAMS trainees versus 96.5 percent for the comparison group.

Trainees thought the content matched their interests and needs. There was a very positive response to the content of the training. Those not versed in medicine felt that information would enable them to better understand the technical side of their job. They found the learning empowering and thought the courses were cutting edge and actually let them know what they were supposed to do. Observations from a focus group at U Houston included: "Hands-on training for medical/NP students was different and exciting," and at CLTCEC they thought, "Having this program gives you a description of what you are actually supposed to do; becoming a caregiver, there isn't a job description." A smaller number of trainees found gaps in the training content, such as specialized roles and emotional preparation for dealing with difficult issues such as the death of a client.

Level 2: Improved Knowledge and Skills

It is important to match the content of the training to the level of existing knowledge and skills. Some trainees felt that they already knew the material and that what they did not know, they could learn better on the job. At a U New Mexico trainee discussion group, one respondent noted that "We have found the medical information presented at weekly meetings and in the training materials to be helpful, but the day to day activities they do are learned on the job from their colleagues." At CLTCEC, an overwhelming majority of caregivers (92 to 99 percent) reported high satisfaction with their training overall and with aspects of the experience, including skill learned and confidence in being able to successfully implement the new skills learned.

While NORC's survey of UAMS trainees currently working as caregivers finds similarly high proportions of trainees and comparison group members reporting that they feel prepared to perform the job of home caregiver (99 percent), UAMS trainees consistently ranked their preparation more highly than did comparison group members; see Exhibit 5.10. In the case of learning techniques for reducing stress, survey data finds that training improves both knowledge and skill sets. For example, among UAMS trainees and comparison group, trainees currently working as a caregiver, the vast majority of respondents

consistently report having learned each skill listed and feeling prepared to perform the job of a home caregiver (see Exhibit 5.11).

Exhibit 5.10: Skills Learned, UAMS Trainees and Comparison Group

Variable	Value, % Responded Yes (N)	
Training Experience	UAMS Trainees	Comparison
Learned Skills to Communicate with Client's Health Care Team	97 (428)	93 (187)
Learned Documentation Skills Helpful to Health Care Team	98 (435)	95 (191)
Learned to Monitor Changes in Client's Health	98.4 (436)	97.5 (197)
Learned How to Talk with Clients About Their Health Goals	95.4 (418)	90.6 (182)
Learned How to Provide Care the Way Clients Prefer	99 (437)	98 (199)
Learned Techniques for Reducing Stress	93.6 (410)*	80.3 (159)*
Feel Prepared to Perform Job of Home Caregiver	99.3 (441)	99 (200)
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	92.8 (413)	90.7 (185)

NOTES: *Difference is statistically significant between UAMS and comparison group at p<.05.

Trainees improved their communication skills. Training around communication is a hallmark for the CHRPT awardees; motivational interviewing was very well received, as was skill building around communication around community resources and for clinicians. These skills may be taught informally, through mentoring or other experiential approaches. Trainees at LifeLong noted that "[peer coaches] have technical skills to empower patients (communication techniques, knowledge of community resources); [the] ability to negotiate with clinicians; [and] knowledge of community resources."

For example, using HCIA funds, UAMS developed an advanced caregiver course called "Family Care Advocate." This class is intended to teach critical thinking skills, empower caregivers to apply their knowledge and skills in caregiving situations, and improve their ability to communicate with the health care team. Among UAMS trainees currently working as caregivers, those who completed the FCA course more frequently reported learning various skills than UAMS trainees who did not complete the course. FCA trainees were significantly more likely to report learning how to talk with clients about their health goals (100 percent), compared to trainees who did not take the FCA course (90 percent). A significantly greater percentage of FCA trainees also reported talking with clients about setting up their homes safely (97 versus 90 percent).

Exhibit 5.11: Family Care Advocate Course Training Experience, UAMS

Variable	Completed FCA Training	Did Not Complete FCA Training
Training Experience	% Responded Yes (N)	
Learned Skills to Communicate with Client's Health Care Team	97.2 (178)	95.4 (250)
Learned Documentation Skills Helpful to Health Care Team	98.4 (180)	97.3 (255)
Learned to Monitor Changes in Client's Health	97.8 (179)	98.1 (257)
Learned How to Talk with Clients About Their Health Goals	99.5 (182)*	90.1 (236)*
Learned How to Provide Care the Way Clients Prefer	98.9 (181)	97.7 (256)
Learned Techniques for Reducing Stress	95.1 (174)	90.1 (236)
Feel Prepared to Perform Job of Home Caregiver	100 (183)	98.4 (258)
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	96.7 (177)*	90.1 (236)*

*Difference is statistically significant between FCA trainees and non-FCA trainees at p<.05.

Trainees gained confidence. Trainees appreciated that knowledge is power. They have been overwhelmed but learning new skills and having a network to draw upon increased their confidence. An example observation from site visit notes at PRHI, "There are nerves when someone is watching you…Hearing someone else's perspective is of great value…the debriefing talks to you about what you can do differently. And you realize that you can do that."

Trainees appreciated learning perspectives from outside of their own professional background. Trainees who were comfortable in their respective roles gained respect and understanding for those on the other side of care. This new appreciation would help bridge the workers and provide for more effective patient care. Examples of focus group trainee observation at Sutter Health included: "It's the first time I have ever been at a job orientation with people outside of nurses…Now I can picture other roles," and at the U Iowa, a 6-month follow-up survey of the trainees indicated that care management adherence improved, that learning about care coordination improved their effectiveness, that they are more knowledgeable about assisting patients and families, and that they have the skills to engage in care coordination.

Level 3: Behavior Change

Change—accepting new roles and techniques—is sometimes difficult. For some of the trainees there was a challenge in understanding and adapting to new roles. Others were not certain they understood what their role should be or what to expect in new environments like home visits. PCCSB focus group observations include: "We are still figuring out what my role is," from a nurse practitioner, and "Basic education can be tough because [the nurses] have been trained a different way before and understanding that medical issues for the elderly are different."

According to U New Mexico internal survey data shared with NORC, while 19 percent of survey respondents felt the ECHO Care training they received when joining the team adequately prepared them for their job, 41 percent felt it did not. Furthermore, 73 percent of ECHO Care Team workforce survey respondents indicated that in their role on the ECHO Care Team, they have major new responsibilities they have not had in the past. Seventy-three (73) percent of respondents also agreed or strongly agreed that their taking on of new responsibilities has led to better patient care. When asked whether, at times, they need to take on responsibilities that are outside their scope of practice, 41 percent of respondents agreed.

Trainees improved their attitudes toward team care after the training. Trainees, by learning with those on the other side of the medical–social care division, gained valuable knowledge and regard for their counterparts. This bridged the gap between physicians and other team members. It empowered individuals to work collectively, resulting in improved patient care and improved work atmosphere. Observations from U North Texas focus groups include: "INTERACT tools have led to a culture shift in Brookdale Senior Living facilities, where all employees are now responsible for patient, not on the nurses (more of a community mindset)," and "[Inter-professional] team training creates forum for shared decision-making, bridging cultural gap between physicians and other team members."

Trainees felt empowered to act. Prior to training, non-clinicians felt a bit cut-off and intimidated by physicians and other clinicians. After training, they felt empowered to communicate and work directly with them. Focus group comments at LifeLong found "[peer coaches] empowered to communicate and negotiate with clinicians," and at CLTCEC, "many providers [caregiver trainees employed by the Medi-Cal IHSS program] are using their communication skills (and confidence) to talk more effectively with doctors and nurses."

Trainees applied the new techniques learned. Trainees learned new techniques for patient care and were able to incorporate them into their work product. They implemented the new skills and found that it improved their job performance. For example, observations from focus groups at LifeLong included: "All around, trying to be patient centered…this is a whole new way of thinking about that…it has helped break down barriers between you and the patient, especially in the clinical setting," and at PRHI, "So now I do that…and validate the patient's feeling…Things I would never ask as a floor nurse. Slow your pace and absorb what you're hearing."

Level 4: Benefits to Awardees and/or Interventions

Awardees gained confident staff and patients. Training often enabled new constructive team dynamics. The techniques helped build rapport and establish connection. Many respondents reported being amazed to see how patients became more independent. Focus group observations from LifeLong praise "Working with the peer coaches, a 'godsend." A lot of what people need are social services or assistance around their medical needs that are not medical…It freed up a lot of time for me so that I can focus on the medical issues. It's been a great partnership," and at PCCSB they observed that "Weekly case review builds rapport and team connection, allows for honest feedback from peers and physicians that improve quality of services and care." Furthermore, the majority of the CLTCEC caregivers surveyed reported increased involvement in the health care decisions and overall health care discussions about the individual in their care.

Successful integration of in-hospital and out-of-hospital staff and functions. The training helped to integrate the health care services with the social services. This blending of worlds afforded better and more coordinated patient care. Focus groups with trainees at CLTCEC found, "We heard many comments that providers feel more at ease integrating with the health care team, and that the course certification goes a long way to boost their confidence (and hopefully the perception others have of them as a team member)," and at CKRI they noted that "informal, tailored training allows the care coordinators to learn collaboratively."

Implications for the Health Care and Home Care Workforce

What can we learn from these changes in staffing and training that may inform workforce transformation, regulation, and policy? In NORC's first annual report, we began to explore contextual factors that have had varied influences on how awardees have approached staffing and training and, conversely, how staffing and training under HCIA may influence the development of the health care and home care workforce. We add the following observations:

State regulations regarding scope of practice, certification for specific health professionals, facilities licensure, and liability (in the case of volunteers and for health workers who perform their work in patients' homes) shape and constrain workforce composition and intervention design. For example, scope of practice statutes that allow nurse practitioners to practice independently enable the University of New Mexico (ECHO Care) and the University of Rhode Island (Living RIte Centers) to employ NPs as clinical providers within their models, a lower cost and more readily available category of staff compared with a physician. (ECHO Care also relies on physician assistants as primary care practitioners, as authorized by New Mexico State law.) Licensure has provided the frame around which some awardees have structured their interventions, for example, Sutter Health's AIM program, implemented at sites under either a hospice or home health license, with staffing requirements that differ with licensure. State certification requirements can promote an awardee's intervention. For example, a new requirement in Arkansas for direct care workers (personal aides) to have completed 40 hours of training has boosted interest in the UAMS Schmieding program, which fulfills that requirement. Conversely, the absence of state-mandated certification and training requirements, as in California, makes recruitment of prospective trainees for the CLTCEC intervention more difficult.

Labor shortages for high-demand roles (advanced practice nurses, nurse practitioners, physician assistants) and, in particular, for specialty fields such as mental and behavioral health and gerontology, also affect the composition of intervention staff and program services. Many awardees report the challenge of recruiting experienced clinical staff, or the inability to retain staff in high demand, as a reason for significantly delayed implementation or for not fully implementing a multi-site intervention as originally envisioned.

Health care market dynamics and payer policies that affect whose and what services are covered, have affected awardees' programmatic and staffing choices and their prospects for sustaining their interventions post HCIA funding. The CHRPT awardees are implementing their interventions in a rapidly evolving market environment, with multiple, overlapping, and sometimes mutually inconsistent payment reforms. Awardees including BIDMC, CCNC, PRHI, St. Francis, and VUMC aspire to integrate their transitional or care coordination services as part of accountable care organizations (ACOs) that can internalize the efficiencies that the awardees' interventions provide. In most of these cases, however, market reforms have not yet caught up with the pace of the HCIA service delivery redesigns. In some states, such as Oregon and New Mexico, the state Medicaid program framework has supported the innovative workforces that Providence Portland and ECHO Care have put in place under HCIA. In other cases, state Medicaid reforms have not been in synch with the HCIA initiatives. Several awardees, notably CLTCEC and URI, may yet be able to secure funding for their interventions under state waivers and demonstrations for dually eligible Medicare and Medicaid patients, but these arrangements are still in the preliminary stage. The South Carolina Research Foundation (HOMECARE+) has proposed to state Medicaid officials that ongoing funding for their RN-led home-based care coordination be reimbursed through a Medicaid waiver.

Organizational capacity to integrate the HCIA-supported staff and training into the ongoing work of the awardee or host institution. This capacity includes hiring, day-to-day integration of work, adding new dimensions to performance reviews (e.g., new staff roles, new expectations regarding team participation,

measuring patient engagement and activation as a full member of the care team) and creation of a formal curriculum with competency testing and other quality assurance around training and performance. Awardees including JHU, Sutter Health, the UN Texas and VUMC are weaving their HCIA-funded programs into the everyday clinical routines of their host health care institutions and cross-training staff throughout their organizations. Awardees such as LifeLong, PCCSB, and St. Francis offer models of a cohesive staff operating a targeted intervention on a limited scale and face ongoing challenges to integrating their services with those of partner hospitals, home health agencies, and primary care providers.

From the perspective of workforce, sustainability appears to be favored or more likely for awardees that are testing the scale-up of an established, evidence-based model; where staff may be tapped or recruited internally or where the labor market facilitates the hire of experienced staff who bring years of practice in both clinical and community contexts; where the intervention relies on inter-professional teamwork on a daily or weekly basis; and where training emphasizes experiential learning through mentoring and shadowing, with frequent feedback to trainees.

Given the diversity of approaches taken by the 23 awardees to staffing and training in the course of implementing their HCIA-funded demonstrations, and ongoing data collection for the evaluation, our observations on sustainability and scalability related to workforce are limited. As NORC completes our analysis of workforce trainee surveys and links qualitative and survey findings with our claims-based analyses of program effectiveness, we anticipate presenting more systematic and comprehensive findings in subsequent reports.

Summary

This chapter has provided an overview of the staffing and training workforce interventions of the 23 awardees in the CHRPT portfolio.

Staffing. Awardee self-reported data to date (through March 31, 2015) suggest that the HCIA-funded interventions have entailed new and more complex staffing and management tasks for project leadership in the awardee organization. While 11 awardees report 20 or fewer individual staff, eight awardees have between 20 and 80 full- or part-time staff, and four awardees note between 80 and 150 staff. Most report 20 or fewer full-time staff. The professional backgrounds of staff, roles, and scopes of practice vary across the portfolio. Almost all awardees employ advanced practice nurses or RNs, and the single largest staff category for the cohort consists of licensed clinical staff that are not independent clinical practitioners. Nearly one-third of awardees employ community health workers and/or patient navigators, part of the second largest staff category across the cohort, that of non-clinical staff. Staffing experiences share themes related to the challenge of recruiting and retaining experienced, well-matched staff, given the relatively short timeframe (3 years) of initial HCIA funding and the shortages and frequent turnover in health care and home care labor markets. Awardees modify existing models of inter-professional teamwork, in some cases staffing a common set of tasks in different ways and in others, creating teams that bring together health care staff with those from social service agencies and/or the independent living rights community.

Training. There is marked diversity in the scope and intensity of training to support innovation, from interventions that rely on experiential training (e.g. shadowing, preceptorships or mentoring) for a small core staff to two interventions (California Long-Term Care Education Center, University of Arkansas for the Medical Sciences) with the goal of preparing the direct care workforce to participate more effectively in delivering care that achieves the triple aim. Nine awardees report training over 500 staff to date. The remaining twelve interventions are either single-site interventions that train between 30 and 70 staff each or multiple-site interventions that train smaller numbers at each site. The cumulative number of training hours varies over three orders of magnitude, from 191 to almost 250,000 hours, with greater numbers of training hours logged where interventions rely on didactic instruction and fewer hours where informal, experiential learning is emphasized. Among the 11 awardees that include competency-based learning (e.g., testing mastery of skills and knowledge), the frequency and intensity of training varies considerably. Across the portfolio, training content builds on three shared content areas, related to care coordination, participant and caregiver engagement, and the building of primary care capacity to serve medically complex and high-risk patients.

We find that in general awardee staff and trainees view their HCIA-funded training as effective. Staff and trainees report growth of knowledge and skills in communication, self-confidence, and awareness of perspectives beyond the trainee's own professional background; behavior change related to their roles, use of new techniques (often described as a challenge), improved attitudes toward team care, and greater empowerment to act; and as benefitting their program by producing more confident staff and participants, and leading to better integration of staff and functions both inside and outside clinical settings.

There are still gaps in our knowledge to be filled in order to fully answer the core evaluation research questions related to workforce. For example, understanding of the implications of these newly modified staff roles and training for the health care and home care workforce more broadly, will be taken up in NORC's third annual report. In the coming months, NORC will continue to analyze workforce and trainee surveys to provide further insight into how the workforce component of these awards have transformed the delivery and use of care and ultimately affected patient health outcomes.

Over the next year we will further examine the impact of workforce development on program effectiveness. What would awardees expect as a result of their respective approaches to workforce development? How much do we know about potential efficiency and effectiveness, based on the peer-reviewed and gray literature? When data are available, additional analysis will also add categorical variables related to staffing and training to regression models, to identify impacts of staffing and training on utilization, cost, and the range of patient outcomes measured using claims and program data. Our future reports will examine team-based care in greater depth, potentially including a variable in the quantitative model to estimate the contribution made by team-based care.

Implementing, Sustaining, and Scaling Innovations: The Role of Context

Overview

At this halfway mark in the evaluation of the Complex/High-Risk Patient Targeting (CHRPT) awardees, nine awardees completed their three-year HCIA-funded period of performance June 30, 2015, and 14 continued operating under CMMI auspices with no-cost extensions (NCEs) ranging from a few months to one year.[43] Some of the awardees that "graduated" from HCIA funding with strong sustainability plans in place—Providence Portland Medical Center's (PPMC's) Health Commons initiative, Sutter Health's AIM program, and University of North Texas' (UNT's) collaboration with Brookdale Senior Living—shared several characteristics, despite serving quite different populations and operating within different organizational, financing and payment frameworks. In this chapter we explore the contextual factors, both those external to the organization sponsoring the innovation (exogenous factors) and those internal to the organization (endogenous characteristics), that facilitate successful implementation, growth, and sustainability of innovative practices. We also discuss those aspects of the external environment that impede the sustainability and spread of innovations, and identify organizational characteristics that pose stumbling blocks to successful implementation and program effectiveness.

Expanding on the treatment of these questions in the first annual evaluation report, we organize the discussion of exogenous factors into the regulatory and policy environment; marketplace dynamics; stakeholder and partner engagement; and community resources and supports, noting how these have supported or impeded awardees' efforts. Similarly, we consider how organizational capacity, leadership, and culture affect the implementation and sustainability of innovative programs and practices, and look for generalizable lessons to draw from awardees' experiences. Throughout the chapter, we highlight the experiences of awardees in three areas--for those serving children, those serving patients with psychiatric and behavioral problems, and those operating in rural areas—to better understand how contextual factors influence their implementation experience and effectiveness.

We offer the following preliminary findings:

In general, organizational capacity, in combination with a favorable financing environment, is associated with sustainability and program growth. While HCIA funding incubates new staffing and service delivery arrangements, and insulates these innovations from the limitations of the larger health care financing environment, with the end of federal support awardees' innovations must integrate in some fashion into institutions' and third-party payers' "business as usual" policies and practices.

Exogenous Contextual Factors

- Several Affordable Care Act (ACA) financing and delivery system initiatives launched concurrently with the Health Care Innovation Awards, including the Medicare-Medicaid Financial Alignment Initiative (FAI), State Innovation Model (SIM) Awards, and Accountable

[43] One awardee, UAMS, received a NCE for administrative purposes only.

Care Organization (ACO) payment options, have had unintended consequences—both positive and negative—for the launching of HCIA interventions and the state policy and marketplace environments within which the interventions operate. The following discussion describes some of these unintended impacts.

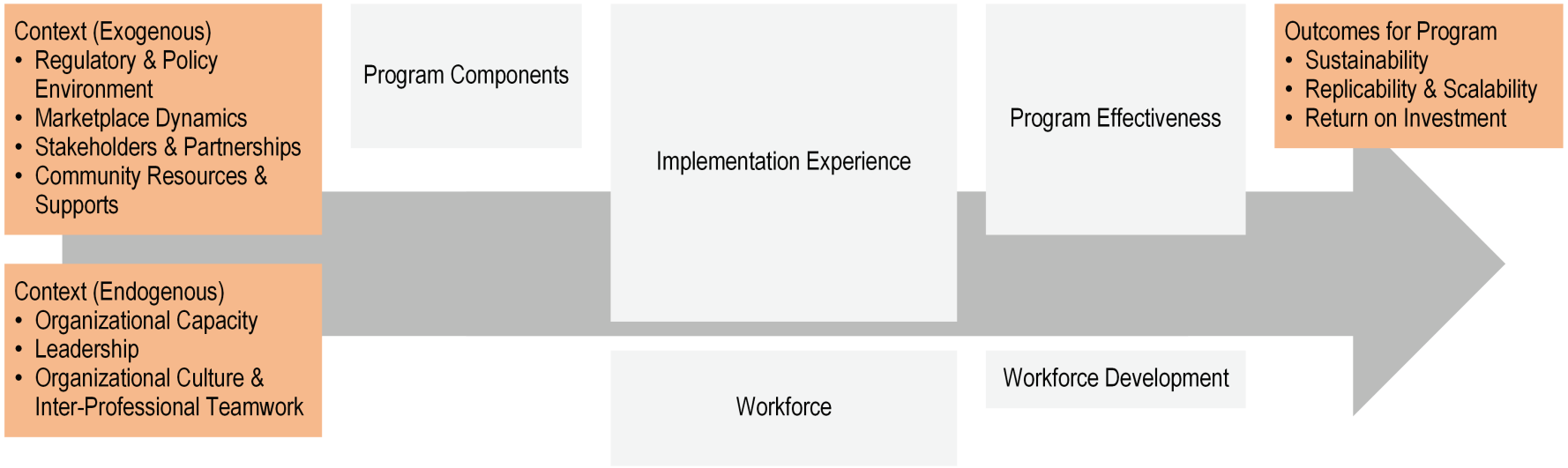
- For awardees whose interventions target Medicaid beneficiaries, state Medicaid benefits, professional credentialing requirements, and organizational structure are critical to the successful implementation and success of the HCIA initiatives.
- The growth of enrollees in states with Medicaid expansions consequent to ACA was more rapid than anticipated, providing awardees with new clientele and unexpected challenges in meeting their needs.
- Stakeholders and partners in HCIA projects provide political, intellectual, and material support that is essential for getting interventions off the ground and for longer term success.
- For awardees serving populations disadvantaged economically and those with psychiatric or substance use disorders or functional disabilities, the availability of the supports and resources within the community, from voluntary organizations as well as publicly provided, are key to successfully addressing the needs of patients.

Endogenous Contextual Factors

- Organizations that can internalize savings or reap other benefits resulting from their innovations involving non-traditional staffing or service delivery approaches are better able to sustain their efforts than those that do not have such internal capacity.
- Leadership with a vision of the way forward to achieve high-value care must be provided both the level of the innovation project and by its host organization(s) to accomplish and sustain change. Initiatives as diverse as those in the CHRPT portfolio may require and benefit from different leadership qualities.
- An organizational culture that fosters critical self-awareness among staff with respect to performance and one that welcomes contributions to improving performance by staff at every level helps providers achieve and sustain reforms in clinical practice and service delivery.

Exhibit 6.1 provides a visual guide to consideration of contextual factors and their hypothesized relationships to sustainability, replicability, and scalability.

Exhibit 6:1: Context, Sustainability, and Scaling: A Visual Guide



Exogenous Contextual Factors

NORC's first annual report briefly addressed some aspects of states' regulatory, policy, and economic environments as they affected the design and implementation of awardees' programs and initiatives. In this report we explore additional features of the external environment that have shaped and influenced awardees' efforts, broadening the scope to also address the presence and engagement of stakeholders and partners in HCIA initiatives and the existence of community resources and supports outside of the health services sector.

Regulatory and Policy Environment

Over one-third (approximately 35 percent) of the U.S. population are enrolled in either Medicare or Medicaid, or both.[44] HCIA initiatives have been shaped by and are challenges to the current benefit structures and payment policies of these two programs. As such dominant payers, Medicare and Medicaid profoundly influence the way health care services are organized and delivered, through their benefit structures, payment policies, and conditions of participation for institutional and professional providers. The HCIA program, along with other payment and service delivery initiatives authorized by the Affordable Care Act (ACA) has rapidly changed the landscape of health care services delivery and financing models over the past five years, particularly but not exclusively in public sector programs. The ACA has created unprecedented opportunities for experiment and innovation, through initiatives such as HCIA, accountable care organizations (ACOs), patient-centered medical homes, and a variety of state-level Medicaid options, including the Financial Alignment Initiative (FAI), the Delivery System Reform Incentive Payment (DSRIP) system, and perhaps most significant, expanded eligibility provisions.

These concurrent changes contribute to the dynamic conditions under which HCIA programs have been established and into which they must be integrated for longer term sustainability. The three-year funding offered by the HCIA initiative has provided critical support for programs that have introduced non-traditional staffing, intensive training, and continuous quality improvement processes. If at the end of the award period, however, these programs return to standard Medicare and Medicaid policies for covered services within a fee-for-service payment environment, innovative practices will be hard to sustain.

State law and policy choices dictate the specific organizational, benefit, and payment structures for their own Medicaid program. States also establish the prevailing standards for licensure and certification of clinical personnel and facilities, determining the scope of practice and practice settings for health care professionals and ancillary staff. In the case of a number of awardees in the CHRPT portfolio, the state Medicaid environment has been a boon to programs' initiatives (Health Commons in Oregon; ECHO Care in New Mexico; Johns Hopkins University's J-CHiP program; LifeLong.) In other instances, the direction being taken by state Medicaid programs has undercut awardees' efforts, as with the Child Health Accountable Care Collaborative (CHACC) in North Carolina, which first experienced the loss of access to Medicaid data for identifying high-risk children in the transition to a new vendor for the State's Medicaid Management Information System and now faces the restructuring of the North Carolina

[44] Authors' estimate, based on the 2014 Current Population Survey and CMS' projected national health accounts estimates for 2015.

Medicaid program from direct provider fee-for-service participation to managed care contracting, with uncertain prospects for the care coordination services now provided by CHACC. In other states, Medicaid policies and reforms have had mixed effects for awardees, such as in California, where implementation of the Financial Alignment Initiative took precedence for Medicaid managed care organizations over coordinating with the California Long Term Care Education Center in the implementation of the Center's Care Integration Training program.

Following are observations about the impact of public program policies gathered from interviews with awardee leadership and their own reports to CMMI.

Several programs in states with expanded Medicaid programs under ACA have experienced more rapid growth in their enrolled population than they anticipated (J-CHiP, PPMC, ECHO Care). This development has provided programs that serve previously uninsured and underserved groups, such as homeless people, with a reliable source of revenue for care provided; it has also challenged the capacity of these programs to provide services to complex patients with problems that have been long neglected due to their limited access to care. The three programs cited have also benefited from their states' Medicaid managed or coordinated care policies and programs, which have allowed Medicaid dollars to cover the non-traditional HCIA staffing and services delivery arrangements introduced under these initiatives. Similarly, in California, a new capitated payment model for health centers in the state has allowed LifeLong's Comprehensive Care Initiative for persons with disabilities to pay for the services of peer coaches and other expanded services.

The restructuring of state Medicaid programs as a result of new financing and program design options under ACA (and also stemming from new state policy directives) have presented HCIA initiatives with unexpected challenges, as well as pathways for growth (CLTCEC; UEMS; CCNC-CHACC)**.** In particular, these concurrent programmatic changes have delayed or complicated awardees' implementation of their interventions, particularly as external partners have had to focus their attention elsewhere. For example, CLTCEC's Care Integration Training for personal care attendants (PCAs) serving Medicaid clients through the In-Home Services and Supports (IHSS) program was predicated on close coordination with Medicaid managed care organizations (MCOs) in the counties in which the training was offered. Because many of the MCOs were also part of the Medicare-Medicaid FAI (in CA, called the Integrated Care Initiative) the MCOs were unable to provide the support to CLTCEC in terms of identifying potential clients for the training and providing utilization information for training participants until well into the HCIA three-year period of performance. By 2015, several MCOs felt they finally had the bandwidth to begin engaging with the CLTCEC training program and consider options for long term engagement.

UEMS' HealthiER program in Buffalo, NY, ultimately became part of the state's Medicaid Delivery System Reform Incentive Payment system (DSRIP), which affected how the program was implemented, fostering communication between hospital EDs and primary care practices. These statewide programmatic changes, however, have also resulted in delays in receiving claims data from the state.

In North Carolina, CCNC has contended with several transitions within the NC Medicaid program. The first shift was a transfer of the state's claims processing contract to a new vendor, which resulted in the

loss of Medicaid data (for most of 2013) with which high-risk children were identified and recruited for the CHACC program. The awardee not only had to devise new systems for identifying potential enrollees but also new ways to chart their own performance. Over the longer term, the NC legislature is contemplating moving from public management to a system of managed care contracts for Medicaid, which would present a serious obstacle to sustaining or scaling CHACC as its parent organization had envisioned.

HCIA programs that operate in more than one state must contend with local and divergent policy and market environments (DDHS; UAMS; U North Texas/Brookdale)**.** Unsurprisingly, multi-state HCIA programs face different constraints and opportunities from site to site. DDHS, for example, experienced an early setback following the HCIA award when its plans to serve as a health home for persons with disabilities under a capitation arrangement with a New Jersey MCO fell through. This affected the sustainability prospects for the awardee, which provided specialized and wrap-around services, as Medicaid reimbursement was limited to fee-for-service (FFS) payments for standard clinical encounters. By contrast, in New York, DDHS is partnering with Montefiore Hospital in order to incorporate care for children with intellectual and developmental disabilities into the Children's Evaluation and Rehabilitation Center. This relationship has been positive for the awardee and promises to be sustainable.

In April 2014 the Arkansas legislature passed a law requiring home caregivers to have 40 hours of training. This has stimulated enrollment in the UAMS Schmieding Center training program for in-home caregivers. In other states in which UAMS offered their highly regarded course of training (CA, TX, HI), take-up was more limited for a number of reasons. First, the reputation of the Schmieding Center was most prominent in its home state, Arkansas. Second, the new certification requirement created a demand for personal care assistant (PCA) training that did not exist in states without a similar training mandate. Third, in other states (e.g., Texas), the job market may have been geared towards a different job classification, such as home health aide, which required a certified nursing assistant (CNA) qualification, rather than PCA training.

Marketplace Dynamics: Health Care Services and Labor Markets

Local and regional markets for health care services vary in terms of competitiveness as measured by the dispersion or concentration of hospital services or the presence and scale of integrated health care delivery systems.

A number of market conditions in the health care services sector, not limited to those consequent to the ACA or other public policies, have resulted in greater consolidation of institutional and professional services over the past decade, a trend that has been seen among the HCIA awardees themselves. Both Brookdale Senior Living and the Courage Kenny Rehabilitation Institute (CKRI) underwent corporate mergers following HCIA funding. In 2014, BSL, a corporation that builds and operates senior living and long term services and supports (LTSS) facilities, merged with another major senior living provider, Emeritus, under the BSL name. The introduction of new leadership with the merger required educating and obtaining the support of new corporate managers for the investments that BSL was making as part of HCIA, apparently successfully. In 2013, the Minneapolis-based Courage

Center was acquired by Allina Health, a nonprofit health care system operating in MN and WI, to become the CKRI. Following this merger, the organization's new leadership temporarily suspended new enrollments into the HCIA initiative as it took stock of CKRI operations. The acquisition by a larger health system has strengthened the prospects for CKRI to sustain its program. Turbulence in local markets and mergers among awardees' counterparts can also confound the implementation of initiatives and delay the formation of functional partnerships.

Awardees with operations in rural communities face particular challenges in recruiting qualified staff and serving their clientele (CCNC, Northland, PRHI, St. Francis, SCRF, Sutter, UIHC, U New Mexico). Long distances for both patients and providers to travel and a limited pool of qualified health care professionals complicate the implementation of new service delivery models in rural areas. For team-based models, such as those of PRHI, UIHC, and U New Mexico, filling the full complement of staff positions in small communities may also prove impractical, because the basic staff model cannot be financially supported by the limited patient population. In the NM ECHO Care program, one small clinic site responded to this problem by relying heavily on their administrative staff person, who assumed responsibilities that a care coordinator would otherwise fulfill.

Stakeholders and Partnerships

If HCIA initiatives are to be stable and sustained beyond the period of federal funding, awardees must find allies in their community who can advocate for the initiative and with whom the awardee can partner.

The scale and scope of HCIA programs and their host institution determine the centrality of partnerships with outside organizations; many HCIA initiatives are inherently collaborative endeavors. Those who finance health care, payers including Medicare, state Medicaid programs, employers, and private insurers are the most influential stakeholders for any intervention. As already discussed in the opening of this section, the rules and policies of public financing programs can determine an awardee's longer term prospects.

The HCIA initiative should be aligned with the interests of stakeholders or partners. Several awardees' initiatives explicitly addressed the goals of Medicare's Hospital Readmission Reduction Program (HRRP) and could make a business case to hospitals whose participation they sought that the hospitals' participation in the initiative could help them avoid readmissions and thus penalty payments (PRHI; U North Texas/BSL). St. Francis gained some traction in terms of physician referrals to its home telemonitoring service when an independent practice association (IPA) briefed its members about how the partnership with the St. Francis service could be used to meet standards of comprehensiveness for patient centered medical home (PCMH) certification.

CLTCEC has traversed a complex institutional and political landscape in California, where in-home services and supports for persons with disabilities and functional limitations enrolled in Medicaid are provided through a separate state agency (IHSS) that operates through counties, which have different IHSS recruitment and client assessment procedures, and different hourly pay rates. Medicaid clients employ personal care attendants (PCAs) directly and IHSS administers reimbursement for PCA services. The consumers of IHSS services in CA are fiercely protective of their prerogative to designate who will

be their PCA, and have been opposed to any kind of minimum qualification or training standard for these workers. CLTCEC, an affiliate of the Service Employees International Union local in LA, provides home caregiver training with the aim of professionalizing the PCA role, and could be expected to endorse minimum training requirements. However, as part of its alliance-building strategy with the state IHSS and Medicaid agencies, Medicaid MCOs serving IHSS clients, and the disability rights community, CLTCEC has been careful to endorse training as an important option and not a requirement of IHSS employment.

Professional and clinical organization partners can strengthen awardees' quality improvement initiatives. CCNC and PRHI both emphasized adoption of evidence-based clinical best practices and enlisted professional and specialty organizations to inform their interventions. Fourteen services network partners in North Carolina, of variable size and complexity, together comprise the statewide initiative, with each partner hosting a clinical services and coordination site as part of CHACC. The state pediatric society is an important stakeholder that has been actively involved in promoting CHACC and supporting the creation and use of the clinical care guidelines. Likewise, PRHI has partnered with the Chronic Obstructive Pulmonary Disease (COPD) Foundation and the American Heart Association, using their educational materials and having them lead practicums or full day trainings for PCRC staff. The COPD Foundation donated a spirometer to each site, and trained a staff member at each site on its use, so that the PCRC could take a reading and forward it to the patient's primary care practitioner.

It should be noted that partnering with several independent organizations, such as PRHI does with community hospitals opening Primary Care Resource Centers (PCRCs) and South Carolina Research Foundation (SCRF) does with Personal Care Partner Agencies (PCPAs), creates special concerns with respect to fidelity of implementation. PRHI explicitly allowed each hospital-based PCRC to rely on services already being provided by the hospital rather than duplicating them, resulting in different arrays of services across the PCRCs. SCRF worked with many different PCPAs, who provided the training for their PCAs directly, which created a lot of variation in implementation of the training programs. At the same time, the deep involvement of the PCPAs was a critical and necessary component of this program.

Cultivating stakeholder support and partnerships takes time, particularly when an awardee is marketing new services or serving a new clientele. A number of awardees have sought the endorsement of stakeholder groups or partner organizations to generate referrals to a new or expanded program. The Living RIte program in Rhode Island had existing relationships with development disabilities organizations in the state. However, when the program extended their services to persons with Alzheimer's disease, it had to introduce itself to a new group of advocacy and service organizations, some of whom were hesitant to endorse the program as appropriate for persons with Alzheimer's disease. Northland sought buy-in from community organizations and long-term care institutions; the latter were intended to provide respite services, although in the end there was no demand for respite care. Northland has also received referrals from community organizations that are unable to provide the requisite services, such as conducting house visits and education on chronic condition self-management, for residents desiring to remain in their homes. St. Francis of Hawaii's H.O.P.E. program relies heavily on referrals for and endorsement of their one-year community-based telemonitoring program from primary care physicians. Although the St. Francis service was well known and valued within the community of providers treating patients with end stage renal disease (ESRD), the population in which it was piloted,

the program's physician director had to build the service's reputation anew with primary care providers more generally on the two islands where the telemonitoring service is offered. Receiving the endorsement of an independent practice association (IPA), who appreciated the contribution the service could make to qualifying their members as a patient-centered medical home, accelerated H.O.P.E.'s enrollment after a slow start.

Community Resources and Supports

Particularly for awardees serving economically disadvantaged and socially isolated populations, social services and resources such as food or prepared meals, transportation, and stable housing can be critical to the success of their initiative. Yet it is in communities that may be limited or over-extended in providing such services that the need for them is greatest. Social workers and community health workers (CHWs) are employed by most awardees serving primarily Medicaid beneficiaries or persons with disabilities. Transportation is a key wraparound service for frail elder and persons living with physical or developmental disabilities, such as the clients of CKRI and URI. CKRI, for example, reports that vans that accommodate persons with physical disabilities are limited and frequently limit service to within a specific county, meaning that patients may have to transfer multiple times in order to arrive at their appointment. For URI clients living in group or residential homes, transportation to appointments is critical, and can be difficult to arrange, given the demands on staff time. In consumer experience surveys conducted with CKRI, LifeLong, and Northland, participants praised the initiative of their care managers, social workers, or life coaches in identifying community resources and their help in gaining access to them.

Stable housing is a particularly difficult resource for program participants with behavioral or substance use disorders to acquire. J-CHiP, PPMC, and ECHO Care staff all cited the difficulty they faced in locating appropriate housing, especially for homeless patients newly discharged from the hospital, for these patients who are often the most difficult to engage in care and self-management.

In rural areas, transportation and social isolation make the contributions of community partners and support services even more essential to awardees' interventions. Northland Care Coordination for Seniors, for example, assists participants in obtaining services such as Meals on Wheels and cleaning services, for those who cannot perform these tasks independently and may not have local family or friends to provide assistance.

Endogenous Contextual Factors

As described in Chapter Two [Overview] and in NORC's first Annual Report, the awardees in the CHRPT portfolio are of diverse scale and structure, ranging from small initiatives within both small and large organizations, to relatively large initiatives within large academic organizations or health systems; and from single-site projects to multiple-site initiatives, some of which operate in several states. A host of organizational characteristics, including size, scope, technological resources, mission, leadership, and workplace culture affect the strategies adopted and the performance of the HCIA initiatives. Here we address the broad dimensions of organizational capacity, leadership, and culture to identify similarities and strengths among the awardees in this portfolio.

For organizational capacity, in addition to institutional material and human resources that directly underpin awardees' efforts in deploying technology (e.g., for health information exchange) and personnel to staff the initiative, awardees embedded within larger organizations also have corporate resources available for championing, scaling, and disseminating the best practices of the HCIA initiatives. By leadership we mean both the people and the executive governance structure at the helm of the initiative and of its organizational home. There may or may not be a clear distinction between these two levels of leadership. Finally, organizational culture embraces a set of propensities that can support learning in doing and revisions in practices, with a clear objective or mission in mind.[45] As articulated by an Institute of Medicine consensus committee, a "learning health care system" depends on health care organizations committed to optimizing care delivery practices, continually improving the value achieved by care, and streamlining processes to provide the best patient health outcomes. This entails equipping managers below the highest level to "set priorities for improvement efforts, establish and implement continuous learning cycles, and foster a culture of respect among staff that empowers them to undertake continuous learning and improve patient care."[46] These three features of an organization: capacity, leadership, and culture are mutually supportive and necessary conditions for success.

Organizational Capacity

Within the CHRPT portfolio, we have examples of awardees implementing similar interventions—improving post-acute transitions of care, treatment options for frail elders, or care processes within SNFs—at very different scales and under different organizational arrangements. Corporate sponsorship, as seen with Brookdale Senior Living and Sutter Health, provide health care innovations with built-in possibilities for spreading the intervention and have management tools and lines of reporting and communication that can promote greater consistency across sites in implementation. Both BSL and Vanderbilt University Medical Center (VUMC) adopted the INTERACT suite of quality improvement tools that were initially developed for use in SNFs.[47] The VUMC HCIA project was smaller, conducted by a gerontology research group within the medical center in collaboration with 23 SNFs, while the UNT/BSL initiative was conducted by a large national senior living corporation, in BSL SNFs and home health agencies, and modified for use in non-medical assisted living and memory care residences. Although the team at VUMC had the support of the medical center, which was interested in this approach as a strategy for reducing readmissions from nursing facilities, and initiated a long-term care services collaborative within VUMC's market area, BSL introduced INTERACT as part of a corporate strategy to adopt some version of the tool in all of its SNFs and HHAs, and created regional training and implementation teams that operated under a central corporate manager.

Two awardees, the Johns Hopkins University J-CHiP program and PPMC's Health Commons in the tri-county Portland, OR, region, similarly launched multi-pronged interventions, ranging from hospital-based PAC services, to augmented clinical teams in ambulatory clinics, and conducted outreach in emergency departments and the community. J-CHiP, however, was launched by a single entity with a management

[45] IOM. *Best Care at Lower Cost: The Path to Continuously Learning Health Care in America*, Washington, DC: NAP. 2012.

[46] Saunders, Robert, and Mark D. Smith. "The Path to Continuously Learning Health Care." *Issues in Science and Technology* 29, no. 3 (Spring 2013).

[47] https://interact2.net/

structure largely internal to the University, with responsibilities for each intervention arm assigned to a different member of the management team. The Health Commons initiative, in contrast, was the product of a newly formed Continuing Care Organization (CCO), Health Share, and its constituent partners, which included Medicaid MCOs subsumed by Health Share, three county mental health authorities, and independent providers, such as Oregon Health Sciences University. More will be said about the leadership qualities in evidence for this undertaking; the point to make here is that Health Commons deliberately looked for best practices from each of its constituent health plans or providers, nurtured their development where the intervention was introduced, and then gradually introduced the intervention in other sites. This approach allowed the CCO, Health Share, to implement the award relatively quickly, and spread practices as appropriate and when they became better understood.

Leadership

Different leadership qualities take precedence, depending on the organizational structure within which the HCIA program is operated, and the scale of the organization. Continuing with the example of PPMC's Health Commons project, the group of community institutions that came together to form Health Share did so by necessity, under a state legislative mandate that created a new financing and organizational structure for the Medicaid program statewide. However, the leadership of the Health Commons project by David Labby, MD, and of the CCO by Janet Meyer, supported the work of innovators in multiple organizations, who were brought together with a shared vision and understanding of their mission with regular learning collaboratives for staff from different hospital systems and county agencies to share notes and deepen their network of connections for referrals and consultations.

In the case of virtually every awardee whose program we have studied, an identifiable leader—person or institution--for the initiative was recognized as authoritative in their field of endeavor, and considered trustworthy by colleagues, stakeholders, and potential partners external to the sponsoring organization. In many instances this natural authority and trust was built over years of work and collaboration (the UAMS Schmieding Center; the principal investigators for St. Francis and UT Houston; the executive director of CHACC, to name just some leaders). Particularly in the dynamic environments in which these HCIA initiatives were launched, the project directors needed to hold a steady vision of what they wanted to achieve, even as the circumstances in which they operated changed radically. Such as was the case for Keith Kanel, Chief Medical Officer and Director of PRHI's PCRC program, for which he sought the participation of two different sets of hospitals, which CMMI determined were not eligible because of their participation in other federal initiatives, before gaining approval of a third group.

Organizational Culture and Inter-Professional Teamwork

Organizational culture can promote learning and high quality performance in a health care organization. We make the following observations about awardees' efforts to achieve an organizational culture that supports their mission.

Clarity about the roles played by different team members and a shared understanding of how they relate to the project's goals are important. Many interventions have elevated the expectations of the role to be filled by non-clinical or support staff, such as nursing assistants and PCAs in long term care facilities and community health workers (CHWs) serving as members of multidisciplinary care teams.

These expectations can initially be resisted or distrusted by staff used to working in more traditional settings, including members of the workforce that is being trained. For example, the implementation of INTERACT tools in SNFs and assisted living facilities (U North Texas/BSL; VUMC) expect nursing and personal care assistants to take a more active role in documenting their observations of residents' health status and emergent problems, and raise any concerns with the nurse on duty. This expectation engenders a sense of communal responsibility and accountability, and builds on current relationships among staff and between residents and staff. Both at BSL and VUMC staff report that the objective communication style, and the expectation that nursing assistants and non-clinical staff participate in observing and documenting changes in patients' or residents' condition, promoted by the INTERACT intervention, reduce ambiguity in and improve communication with clinical staff, potentially preventing the exacerbation of health problems that lead to hospital care.

In the ECHO Care initiative of the well-established Project ECHO model at U New Mexico, in which outpatient intensivist teams (OITs) serve the most complex and difficult-to-engage Medicaid enrollees, specialists at the University, despite being familiar with tele-communication and tele-mentoring of primary care physicians, were initially unused to working with CHWs as a member of the team in full standing. Likewise, CHWs were initially diffident about sharing their knowledge and expressing their views in weekly consultations with the U New Mexico specialists. By the time of NORC's site visit in 2014, U New Mexico specialists reported a much greater appreciation for the CHWs' perspective on patients' conditions and needs, and of the life challenges of the patients that the OITs served.

Novel interventions often require the integration of diverse and unprecedented staff roles and for staff to be versatile. In LifeLong's Comprehensive Care Initiative for adults with disabilities, nurse care managers and peer health counselors faced difficulties in understanding and integrating their respective roles. Clinical staff at the participating federally qualified health centers (FQHCs) were unaware or confused about the tasks performed by independent living specialists, and the project devoted time and energy to meld the clinical orientation of FQHC staff with the goals and perspectives of independent living counselors.

PPMC's Health Commons project recruited a diverse workforce with a strong emphasis on behavioral health, social work, and the perspective of trauma-informed care, led by Health Resilience Specialists (HRS), typically counselors with master's level training rather than non-clinical CHWs. After initially staffing the HRS position with CHWs or other lesser trained staff, the awardee realized that their high-risk patients' needs were so complex that they needed more highly trained staff in the HRS role. Care teams reported that program leaders have done a good job hiring staff with the right mix of skills, background and disposition, referring to the team's complement of skills as a "Swiss army knife."

Sustainability, Replicability, Scalability

The overall goals of the HCIA Round 1 grant program are to test promising models for improved quality of care and patient experience and reduced cost, so that awardees can sustain and others replicate or scale

up the most successful models, or aspects of those models.[48] For its HCIA 1 awardees, CMMI requires reporting related to sustainability planning, as well as expectations that definitive evidence of cost savings will make a business case for adopting part of all of an intervention model.

In NORC's First Annual Report[49], we presented an initial analysis of sustainability and scalability, finding that key factors that support or impede success include financing, having hired and being able to retain the right staff, and partner support.

Since our first Annual Report, we have reviewed additional awardee program documents and supplemental materials (e.g., awardee websites, conference presentations, You Tube videos, peer-reviewed publications and reports), conducted additional site visits and interviews, and conducted theme-based coding and analysis of our primary data. In this section, we present the preliminary findings of these reviews and analysis, building on our findings from a year ago. See Appendix Exhibit E.9 for a detailed summary of awardee sustainability plans to date (based on awardee's Q11 reports through March 31, 2015, and NORC primary data collected through June 2015). This Exhibit considers both elements to be sustained and funding sources. It will serve as a foundation for more comprehensive analysis and linkage with survey and claims-based analyses, to be presented in NORC's third annual report.

Sustainability

Overall, 22 of 23 awardees report planning to sustain either part or all of their intervention after the end of the initial period of HCIA funding. Of these, 14 received no-cost extensions from CMMI, either for specific intervention components (partial) or for the intervention as a whole (full), for a specified period of months. Appendix E includes a summary table of awardee plans for sustaining their interventions beyond the end of the initial period of HCIA funding (June 30, 2015).

To think about sustainability and scalability more systematically and comprehensively, we adapt a construct developed by the Center for Public Health Systems Science at Washington University in St. Louis.[50] The Center's validated Program Sustainability Assessment Tool (PSAT) identifies eight domains, each of which contributes to the capacity of an organization "to maintain programming and its benefits over time." The domains are as follows:

- *Environmental Support*. Having a supportive internal and external climate for your program. This would include the exogenous context variables of political support and policy changes.
- *Funding Stability*. Establishing a consistent financial base for your program. This could include public and/or private payers.

[48] Our evaluation design gives the following definitions:

Sustainability. The "extent to which changes resulting from innovation are maintained or institutionalized within the organization" and "extent to which the change is sustained through adaptation and refinement" (through inputs external to HCIA).

Scale up and Spread (Replicability and Scalability). The "plans, timing, and/or methods of spread within and beyond the adopting site."

[49] Submitted September 9, 2014; revised final version, March 2015.

[50] At https://sustaintool.org/understand.

- *Partnerships*. Cultivating connections between your program and its stakeholders.
- *Organizational Capacity*. Having the internal support and resources needed to effectively manage your program and its activities.
- *Program Evaluation*. Assessing your program to inform planning and document results. This could include having access to data developed for self-monitoring as well as to demonstrate cost savings.
- *Program Adaptation*. Taking actions that adapt your program to ensure its ongoing effectiveness.
- *Communications*. Strategic communication with stakeholders and the public about your program.
- *Strategic Planning*. Using processes that guide your program's direction, goals, and strategies.[51]

Since our evaluation questions focus on replicability and scalability as well as sustainability, with the intervention itself being central (as opposed to, say, the awardee's capacity for sustainability), the use of PSAT scoring is not appropriate for our purposes. However, the PSAT offers a useful rubric for comparing the plans and experiences to date of the CHRPT awardees. In particular, factors that have come to the fore in our evaluation, including environmental support, funding stability, partnerships, and organizational capacity.[52]

Considering awardee plans for sustainability as we now understand them, we make the following observations.

Public Policy and Regulatory Environment

Federal and state regulations can provide impetus for innovative programs; if not enforced or prioritized, their impact is lessened. For the UAMS program, a 2014 state law requiring home caregivers to have 40 hours of caregiver training spurred enrollment in the program within Arkansas. However, the state has not created a monitoring and enforcement structure for this legal mandate. In other states in which UAMS offered similar training (CA and TX), the states' approaches to regulating training presented obstacles to and delayed approval of the training program.

The Hospital Readmissions Reduction Program and associated penalties have motivated hospitals to develop referral networks for post-acute care for high-risk patients (those transferred to SNFs or rehabilitation facilities) as well as for moderate-risk patients (those being discharged to assisted living, who have dementia, or returning to home). VUMC and U North Texas/Brookdale anticipate that pending CMS policies regarding hospital readmission from SNFs, including public reporting on SNF readmission rates in 2017, followed by readmission penalties for SNFs starting in 2018, will stimulate interest in their

[51] All of our CHRPT awardees are involved in program evaluation (including self-monitoring) and program adaptation to some extent, given the performance terms of the HCIA grant. For each of the eight domains, the PSAT has a set of 5 questions concerning specific contributing factors, for example, the existence of strong program champions as one aspect of the Environmental Support domain. Each of the questions is answered on a seven point scale and the scores for each of the domains summed to arrive at an average score for the domain, and based on the eight average scores, an overall summary score. Comparison of average scores for domains against the overall summary score offers a diagnostic on areas of relative strength and weakness with regard to building sustainability capacity.

[52] The factors of communications and strategy planning have not been an emphasis in our evaluation design, for the most part, so that we are unable to assess the relative extent of awardee activity in these two areas, nor the efficacy of their respective efforts.

respective interventions from nursing homes as well as hospitals.[53] PRHI noted that current penalties are based on pre-HCIA data so their participating hospitals' investment in the Primary Care Resource Centers affect their readmissions score for several years.

Funding Stability

The single most important factor related to sustainability is payer arrangements. The difficulties faced by the awardees in replacing HCIA funding that supports staff and services reflect the challenge of operating in a largely fee-for-service (FFS) Medicare environment that is in transition to varied value-based purchasing arrangements (some of which are CMMI models at this point) and, with respect to Medicaid, within dynamic and sometimes uncertain state programmatic frameworks. Increasing managed care contracting at the states' initiative, and federal waivers that allow for more fundamental financing and organizational changes, are at the root of much of this rapid change. HCIA funding offers the short-term promise of capitated funding; adapting the intervention that emerges from this short-term period to the exigencies of the health care marketplace is a more difficult enterprise.

Newer and more intensive services, such as the enhanced discharge planning and documentation and communications with SNF staff that VUMC provides, and the frequent—sometimes daily—communications of CKRI's care coordinators with their clients, were not envisioned in Medicare's episodic hospitalization payments or monthly fees for chronic care management.

The widespread and ongoing reforms of Medicaid programs at the state level, spurred by federal eligibility expansions and waivers for innovative financing, particularly the Financial Alignment Initiative (FAI) that integrates Medicare and Medicaid benefits and payments, have created short term uncertainties and delays in awardees' plans for sustaining and scaling their innovations. In California and South Carolina, for example, Medicaid managed care plans are operating under waiver provisions and, while the plans are interested in the CLTCEC and SCRF training models, have been focused on enrolling Medicaid beneficiaries and meeting new waiver requirements. Thus both of these awardees have had to delay developing their partnerships with health plans that have been part of their models from the beginning. In North Dakota, an ACO became operational January 2015 and Northland hopes to establish a partnership with the ACO to provide care coordination to its participants, but this is still pending. In Minnesota, CKRI has an agreement with the state Medicaid program, Integrated Health Partnership, for both FFS and managed care enrollees; however, because this agreement does not include waiver or home and community-based services, CKRI is responsible for the cost of services that might otherwise be covered.

For a small and highly complex population, such as the medically fragile infants and children served by UT Houston's HRCC, the multiplicity of possible Medicaid arrangements (some FFS enrollees and several managed care organizations) with different benefit policies and payment structures poses administrative challenges for the awardee and confuses parents, who must navigate different rules if they change plans. The HRCC must negotiate its rates yearly with each Medicaid managed care plan as well as the state. In addition, the plans have different preferred durable medical equipment (DME) vendors and

[53] The reporting and penalty provisions were enacted as part of the Protecting Access to Medicare Act of 2014 and the Improving Medicare Post-Acute Care Transformation Act of 2014, respectively.

coverage policies, which can seem arbitrary and inequitable to parents, and require the HRCC staff to be familiar with many different sets of conditions (such as ventilator model and wheelchair replacement policies) across their patient population.

In contrast to these many issues that awardees face with a changing Medicaid environment, the initiatives of the Health Commons program by PPMC in Oregon have been cultivated within a favorable Medicaid environment. As previously discussed, the several partners in the Health Share Coordinated Care Organization (CCO) in the tri-county Portland region, a Medicaid financing and service delivery structure established by state law and operating under a federal waiver, have worked together to sustain the many arms of the Health Commons program as part of Health Share.

Partnerships and Community Supports

Strategic community and national partners for the HCIA initiatives can help the awardee sustain their work after the HCIA funding ends. Awardees that developed key partnerships over the past three years include DDHS, which became affiliated with the Albert Einstein Medical Center in New York City; LifeLong LCCI, which enlisted the Center for Independent Living to advocate for the LCCCI model of peer coaching and workshops for clients with disabilities and brain injury; and PRHI, which partnered with the American Heart Association and the Foundation for Chronic Obstructive Pulmonary Disease (COPD) to develop up-to-date curricula and provide resources for trainings in congestive heart failure and COPD.

Because of the acuity, complexity, and frequent social disadvantage of the populations served by programs in the HCIA CHRPT portfolio, community-based programs and resources are needed in conjunction with the awardee programs to serve these populations well. Social workers, CHWs, and care coordinators in awardee programs relied on services such as the Supplemental Nutrition Assistance Program (SNAP), Meals on Wheels, community food banks, housing assistance, group homes, income support, and substance abuse treatment services for their clients. Communities and awardees varied, unsurprisingly, in the degree to which the local demand for a particular service correlated with its local supply. Despite the ingenuity and persistence of CHWs and social workers in locating services for their clients, oftentimes needs, especially for housing and substance abuse treatment, could not be met. Awardees can only be as successful in addressing the social determinants of health as their partner and community resources permit.

Organizational Capacity, Leadership, and Culture

Organizations with extensive internal management and capital resources to operate complex interventions in changing, uncertain, or provisional financing environments, such as Medicaid and short-term federal funding provide, have a great advantage in sustaining or scaling their HCIA initiatives. Notably, Sutter Health and Brookdale Senior Living (U North Texas' partner) have been able to leverage their internal investments with HCIA funding that has allowed them to staff, provide training for, and evaluate internally the impact of their innovations, with an eye to scaling them post HCIA to additional sites.

A related point is that innovative programs with multiple sites that can delegate oversight to local managers or partners means that the local sites, either corporate or partners, are more likely to take ownership of the program and be committed to sustaining the intervention. In addition to the two corporate programs just discussed, we see this with PPMC, PRHI, and U Iowa. Furthermore, sustainability is strengthened when local sites can adapt the intervention to local institutional context and needs. When sites take ownership and modify intervention to better fit their own objectives, target populations, resources, or other local considerations, however, it may be difficult to maintain model fidelity. For example, with CCNC, each site implemented their own version of CHACC, responding to the needs of their child population and the local care coordination arrangements already in place. Following the end of HCIA, each site is determining whether and how to sustain their CHACC team.

A key indicator of capacity and leadership, and prospects for sustainability, is the awardee's success in recruiting and retaining the right staff for innovative interventions. Many awardees noted that they learned quickly from any mistakes made in hiring staff for new roles the attributes they needed to look for in a candidate. Most of all, effective incumbents in new roles related to training, care coordination, patient engagement, and addressing clients' social needs needed to be flexible and resourceful. According to U Iowa leadership, their critical access hospital partners had to trust and rely on an academic health center and this, in turn, depends on strong, confident staff: "Success of these programs is based on the caliber of people you can recruit and the relationships you can build." [U Iowa Leadership Overview, June 2014]. A Northland client observed that "the program is only as good as the people who administrate and work at it. I don't think you can just go hire anyone. That's not going to work. They need to be a nurse and need to want to work with older people or people with a problem." [Focus group with participants and caregivers, Bismarck].

Innovators such as the awardees in the CHRPT portfolio are challenged to create systemic cultural change and receptivity, as well as make organizational changes. Particularly in the case of caring for patients with late stage disease, advanced age, and in post-acute institutional settings, providing care in the least restrictive environment and in line with the preferences of well-informed patients and families remains work in progress. Awardees providing or transferring patients to SNF and palliative care, and those who serve patients in assisted living facilities, cite the importance and difficulties of engaging patients and their families in conversations about end of life choices. One long term care executive regretted the very "risk adverse" industry standard of hospitalizing patients to minimize the facilities' risk of liability. Likewise, family members of patients in SNFs and residents in assisted living facilities are often resistant to the facilities best efforts to demonstrate their competence to attend to a patient's worsening condition without an ambulance transfer to the hospital.

Promoting interdisciplinary team work often involves changing traditional roles and standard forms of organizing work. U Iowa improved the functioning of their centralized and remote staff by bringing people together across the sites more often and organizing work by location rather than by disease category, noting the importance of "Prioritiz[ing] building strong relationships first, then lay out the medical protocols."[54] Awardees have worked toward organizational culture change as they have introduced clinicians to working together across professional lines and with non-clinical staff such as

[54] U Iowa HCIA Quarter 11 Report.

CHWs (Sutter Health, U New Mexico, CKRI), and to elevating and make more central the priorities of their participants (JHU SON, LifeLong).

Replicability and Scalability

Sustainability overlaps to a considerable degree with replicability and scalability, seen perhaps most clearly in interventions that expand on an evidence-based pilot (DDHS, JHU SON, St Francis, Sutter Health, UT Houston). Contextual factors that promote or hinder sustainability often have similar effects on replicating or scaling up an intervention. See Appendix Exhibit E.10 for a preliminary summary of awardee plans to replicate and/or scale elements of their respective interventions. The Exhibit also includes salient guidance from awardees about the prospects for replicating and/or scaling, applying lessons learned from the implementation process. As with our sustainability Exhibit (E.10), this Exhibit will serve as a foundation for more comprehensive analyses in future NORC reports.

Considering awardee plans for replicating or scaling as we now understand them, we make the following observations.

Public Policy and Regulatory Environment. Awardees are considering the likely influence of state labor certification requirements for direct care workers (CLTCEC, UAMS, SCRF) and of state and federal regulations to ensure patient choice, which can disrupt the continuity of warm handoffs among providers that is key to the fidelity of many transition of care programs like Sutter Health's AIM innovation.

Funding Stability. The terms of engagement with Medicare and state Medicaid programs, including waivers and related payer reforms, can create an opening for replicating or scaling, for example, where capitation or other risk-based contracting enters a local marked in the form of a Medicare ACO (Northland), or where innovation elements may be included in the scope of a home and community-based waiver (JHU SON, SCRF) or case management (UEMS, U New Mexico, URI).

Partnerships and Community Supports. Funding and partnerships are closely intertwined, for example, where hospitals or SNFs (starting in 2018) facing more substantial readmissions penalties may seek partnerships with senior residences that host innovations like DASH or INTERACT, with the potential to reduce risk. Alternatively, the absence of capitated funding or penalties can hinder partnerships that support replication or scaling.

Organizational Capacity, Leadership, and Culture. As noted earlier, awardees with the internal capacity to sustain their HCIA-funded innovations (Sutter Health, U North Texas partner Brookdale Senior Living) are well situated to replicate and scale further within their respective organizations, taking advantage of efficiencies of scale and of scope.

Groups of Special Interest: Pediatric, Rural, and Behavioral Health Populations

Pediatric (CNCC, UT Houston). Our two awardees with interventions serving high-risk children represent different approaches to a shared goal: that of integrating specialty and primary care, along with providing parent (caregiver) engagement and support. Their several design differences have implications

for sustainability. For each, sustainability depends on securing Medicaid support, engaging stakeholders among providers and community programs, cultivating inter-professional teamwork, and engaging parent caregivers. However, the interventions are of considerably different scale and scope: CHACC is one of multiple care coordination programs that CNCC operates as a vendor to North Carolina's state Medicaid office and the program reach of CHACC is statewide, through co-management teams sponsored by nonprofit provider networks. The UT Houston intervention is a single, comprehensive clinic staffed by one dedicated team and serving a clearly defined group of families within a single geographic area. For the CHACC intervention, convening pediatricians and specialists into a statewide Clinical Integrated Network (CIN) is part and parcel of sustaining the intervention, as well as navigating the prospect of change in North Carolina's Medicaid program, potentially from publicly administered to run by managed care companies. Sustainability is very much a function of decisions by each network hosting a co-management team, in terms of how well integrated the CHACC work is with other site-affiliated programs and services, and decisions made about tailoring the intervention to patient needs and organizational capacity at the site. In contrast, UT Houston strives to maintain a specialized, stable clinical staff. Its organizational home is the UT Houston Medical School, which is collocated with Memorial Hermann Hospital, which make in-kind contributions to the High Risk Children's Clinic. Medicaid policies and reimbursement rates are more of a central concern for sustainability. UT Houston has served as a model for and been visited by hospital-based pediatric programs in other cities and states as a model for caring for medically fragile children but, like CCNC, has not proposed immediate plans to replicate or scale its program. Each pediatric program has defining characteristics unique to its organizational host and staff; these include strong and experienced leadership for both awardees and core teams of committed stakeholders and staff, which do not lend themselves easily to replication.

Rural (Northland, SCRF, St Francis, UAMS, U Iowa, U New Mexico). Sustainability in a rural context often means addressing workforce shortages for the experienced, skilled care coordinators, advanced practice nurses and social workers, and non-clinical staff involved in patient engagement (CHWs, peer educators). One way that awardees address the dearth of specialized staffing—and distances—is through web-based and telehealth approaches, which can leverage the time of one staffer to engage with multiple patients at a distance, at relatively modest cost, compared with the resources to staff and budget for in-person visits. UAMS and SCRF plan to sustain core elements of their respective interventions by offering web-based versions of their respective personal care aide training. U New Mexico's ECHO Care model of web-supported telementoring will continue to offer access to weekly specialty rounds and continuing medical education for rural providers who are members of each site's Outpatient Intensivist Team (OIT). Northland and U Iowa plan to continue their use of Skype, telephone, and web-enabled communication to connect providers in different locations and to engage with patients and caregivers; and St Francis proposes ongoing support for patient self-management with remote monitoring of vital signs through at least one home care agency.

A second, more fundamental aspect of sustainability for rural interventions is through the strength of awardee relationships with partners on whom they rely for implementation and for maintaining fidelity to a shared vision of innovation: for Northland, community agencies serve in this role, and for SCRF and UAMS, home care agencies play this role, while rural hospitals are key partners for U Iowa and rural clinic sites for some of U New Mexico's OITs. Few rural awardees have plans to scale their interventions,

aside from U New Mexico's discussions with Medicaid managed care plans about possible expansions to new sites for ECHO Care's OITs. At present, the relationship between ECHO Care and the Medicaid plans is shaped by the state's expectation that each plan include ECHO Care as part of its care delivery; this relationship could offer supportive conditions for replication within the state if all partners agree to the financial arrangements.

Behavioral Health (CKRI, DDHS, J-CHiP, LifeLong, PPMC, U Iowa, U New Mexico, URI). The CHRPT portfolio includes three basic approaches to behavioral health: integrated care (CKRI, DDHS, J-CHiP, URI), independent living and disability rights (LifeLong, URI), and care coordination (J-CHiP, PPMC, U Iowa, U New Mexico). For all of these approaches, sustainability depends the ability to hire and retain appropriately trained and experienced social workers, master's and doctoral level behavioral health specialists, and clinicians (nurses, physicians) with expertise in specific patient populations, for example, traumatic brain injury for CKRI, addictions for U New Mexico, and with persons living with intellectual or developmental disabilities for DDHS and URI. In addition, all of these interventions grapple with eligibility and reimbursement rules in connection with state Medicaid programs, most often as interpreted by managed care plans, where there may be carve-outs for behavioral health assessment or services. For example, DDHS and URI both identify potential roadblocks in what are seen as deficiencies in how health plans manage the care of persons with intellectual or developmental disabilities, compared with other groups of Medicaid beneficiaries at high risk for hospitalization. Lack of capitation and other value-based purchasing for behavioral health in many states, at least at this point in time, put awardees at a disadvantage for sustaining their work beyond the initial HCIA funding period. PPMC is the exception to this rule, given the design and implementation of its behavioral health arms within the context of statewide Medicaid reform and collaboration with mental health programs in the three participating counties.

Scaling behavioral health interventions is more likely where pre-existing working relationships or funding are supportive, for example, LifeLong's plans to continue collaborating with its partner, the Center for Independent Living, to market its combination of care coordination by both registered nurses and peer coordinators, along with patient engagement workshops, to other community health centers. PPMC (now Health Share and partners) plans to explore the replication of its suite of interventions by other Coordinated Care Organizations that are part of Medicaid reform across Oregon.

Summary

Midway through NORC's evaluation of the CHRPT portfolio, we have begun to identify the contextual factors that support or constrain implementation, sustainability beyond the initial period of HCIA funding, replicability and for some awardees, plans to scale up their innovations. Data collection and analysis will continue into our third year, as greater numbers of claims are received, survey results assessed, and coded primary data integrated more fully.

We consider factors both external to the awardees (including regulatory and policy environment, health care marketplace dynamics, stakeholder and partner engagement, and community resources and supports), as well as internal factors (including organizational capacity, leadership, and organizational culture related to teamwork). We find that organizational capacity, combined with a favorable financing

environment, is associated with sustainability and program growth. While HCIA funding nurtures new staffing and services delivery arrangements, insulating these innovations from the constraints of the larger regulatory and market environments, the end of HCIA funding presses awardees to integrate in some fashion into "business as usual" health care financing and payment policies and practices.

Our early analysis of the intertwined domains of sustainability, replicability, and scalability echo these findings related to the context of implementation. We identify key factors within the domains of public policy and regulatory environment, funding stability, partnerships and community supports, and organizational capacity, leadership, and culture. For awardees serving high-risk children, these factors relate predominantly to securing Medicaid support, engaging stakeholders among providers and community programs, cultivating inter-professional teams, and engaging parent caregivers. For those serving rural populations, the issues of labor market shortages and the importance of stakeholder partnerships are highlighted. And for innovations that include a behavioral health component, sustainability and scaling depend critically on being able to hire and retain appropriately trained, skilled, and motivated staff, as well as the capacity to navigate complex and fast-changing state Medicaid programs.

TECHNICAL APPENDICES

Appendix A: Awardee and Intervention Names and Abbreviations

Awardee		Intervention	
Full Name	**Abbreviation**	**Full Name**	**Abbreviation**
Beth Israel Deaconess Medical Center	BIDMC	Post-Acute Care Transitions	PACT
California Long-Term Care Education Center	CLTCEC	Care Team Integration of the Home-Based Workforce	IHSS Integration
Community Care of North Carolina	CCNC	Child Health Accountable Care Collaborative	CHACC
Courage Kenny Rehabilitation Institute	CKRI	Advanced Primary Care Clinic	APCC
Developmental Disabilities Health Services	DDHS	Developmental Disabilities Health Home	DD Health Home
Johns Hopkins University	J-CHiP	Community Health Partnership	J-CHiP
Johns Hopkins University School of Nursing	JHU SON	Project Community Aging in Place, Advancing Better Living for Elders	Project CAPABLE
LifeLong Medical Care	LifeLong	LifeLong Comprehensive Care Initiative	LCCI
Northland Healthcare Alliance	Northland	Northland Care Coordination for Seniors	NCCS
Palliative Care Consultants of Santa Barbara	PCCSB	Doctors Assisting Seniors at Home	DASH
Pittsburgh Regional Health Initiative	PRHI	Primary Care Resource Center	PCRC
Providence Portland Medical Center	PPMC	Tri-County Health Commons	Health Commons
South Carolina Research Foundation	SCRF	HOMECARE+	HOMECARE+
St. Francis Healthcare Foundation of Hawaii	St. Francis	Home Outreach Program and E-Health	HOPE
Sutter Health Corporation	Sutter Health	Advanced Illness Management	AIM
University Emergency Medical Services	UEMS	Better Health through Social and Health Care Linkages Beyond the Emergency Department	HealthiER
University of Arkansas for Medical Sciences, Schmieding Center	UAMS	Cost-Effective Delivery of Enhanced Home Caregiver Training	Home Caregiver Training
University of Iowa Hospitals and Clinics	U Iowa	Transitional Care Teams	TCT
University of New Mexico Health Sciences Center	U New Mexico	Extension for Community Healthcare Outcomes (ECHO) Care	ECHO
University of North Texas Health Science Center	U North Texas	Brookdale Senior Living Transitions of Care	BSLTOC
University of Rhode Island	URI	Living RIte Centers	LRC
University of Texas Health Sciences Center	UT Houston	High-Risk Children's Clinic	HRCC
Vanderbilt University Medical Center	VUMC	Reducing Hospitalizations in Medicare Beneficiaries	IMPACT-INTERACT

Appendix B: Definition of Acronyms

Acronym	Description
ACS, ACSC	ambulatory care sensitive condition
ACP	advance care planning
ADE	adverse drug event (associated with hospitalization)
ADL	Activities of Daily Living
AL/MC	assisted living/memory care
APN	advance practice nurse
AT	assistive technology
ATE	average treatment effects
BAA	business associate's agreement
CAD	coronary artery disease
CAHPS, HCAHPS	Consumer Assessment of Healthcare Providers and Systems, hospital CAHPS
CDSMP	chronic disease self-management program
CHC	community health center
CHF	congestive heart failure
CHIP	Children's Health Insurance Program
CMS VRDC	Centers for Medicare & Medicaid Virtual Research Data Center
COPD	chronic obstructive pulmonary disorder
DID	difference-in-differences method
DME	durable medical equipment
DUA	data use agreement
E&M	evaluation and management
ED	(hospital) emergency department
EHR	electronic health record
EOL	end of life
ESRD	end-stage renal disease
FFS	fee for service
FQHC	federally qualified health center
GEE	generalized estimating equation
GLM	generalized linear model
HCC	hierarchical condition categories
HCPCS	healthcare common procedure coding system
HIT	health information technology
HTN	hypertension
IADL	Instrumental Activities of Daily Living
ICU	hospital intensive care unit
IDD	intellectual or developmental disability
ILS	independent living skills
IP, HC/IP	inpatient, hospital
IRR	Inter rater reliability
LOS	length of stay
LPN	licensed practical nurse
LTC, LTSS	long term care, long term services and supports
MCC	multiple chronic conditions
MC/MCO	managed care/managed care organization
MS-DRG	diagnosis-related group, coding system used by Medicare, also known as CMS-DRG
NH	nursing home
NPI	national provider identifier
OT	occupational therapist

Acronym	Description
PAC	post-acute care
PACE	Program of All-Inclusive Care for the Elderly
PC, PCP	primary care, primary care practitioner
PHCA	personal health care agency
PMPM	per-member, per-month (capitation payment)
POLST	Physician Orders for Life-Sustaining Treatment
POST	Physician Orders for Scope of Treatment
PT	physical therapist
PV	practitioner visit
SNF	skilled nursing facility

Appendix C: Secondary Data Collection and Analysis

Overview

This appendix offers an overview of secondary data collection for the NORC evaluation and further detail on our analytic methods. We provide details of our methods and describe awardees' data sources and populations, measure specifications, and analytic models.

We examine three kinds of outcomes or dependent variables: measures of health, costs and resource use, and quality. Preliminary quantitative analyses focus on the four core measures: all-cause hospitalizations, emergency department (ED) visits, hospital readmissions, and total cost of care, as appropriate.[55] In the case of awardees where the index event is a hospitalization, we report readmissions within 30 days and 90 days of discharge, with the latter measure reflective of all-cause hospitalizations. We include appropriate supplemental measures where feasible.

We examine the impact of awardees' interventions and compare each awardee's patients with similar patients (a comparison group), where possible. Our approach to answer the research questions on program effectiveness depends on the nature and setting of the intervention, and is tailored to each awardee. The remainder of this section outlines the general analytic approaches used.

For the purpose of evaluation, we have identified two broad types of interventions—post-acute care (PAC) interventions and ambulatory care programs.

- Post-acute care interventions focus on improving patient outcomes during or immediately after a discrete event, such as hospitalization. Qualifying events are readily identifiable from claims and allow for easy identification of program participants and potential comparison populations.
- Ambulatory care or community-based interventions seek to identify and care for participants in the outpatient setting. These patients are more difficult to attribute to a provider and may not be readily identifiable from claims records.

Exhibit C.1 lists awardee interventions by setting, hospital/post-acute, community, or both.

[55] The four core measures identified by CMMI are intended to provide a consistent set of measures for comparison across all 107 HCIA awards.

Exhibit C.1: Intervention Settings by Awardee

▪ Beth Israel Deaconess Medical Center ▪ Pittsburgh Regional Health Initiative ▪ University of Iowa Hospitals & Clinics ▪ Vanderbilt University Medical Center	▪ California Long-Term Care Education Center ▪ Community Care of North Carolina ▪ Courage Kenny Rehabilitation Institute ▪ Developmental Disabilities Health Services ▪ Johns Hopkins School of Nursing ▪ LifeLong Medical Care ▪ Northland Healthcare Alliance ▪ University of Texas Health Science at Houston	▪ Palliative Care Consultants of Santa Barbara ▪ South Carolina Research Foundation ▪ Sutter Health ▪ University Emergency Medical Services ▪ University of Arkansas for Medical Sciences ▪ University of New Mexico ▪ University of Rhode Island	▪ Johns Hopkins University ▪ Providence Portland Medical Center ▪ St Francis Healthcare Foundation of Hawaii ▪ University of North Texas

Exhibit C.2 summarizes our evaluation design for the two intervention types.

Exhibit C.2: Methodological Overview by Intervention Type

	Post-Acute (Hospital)	Ambulatory Care/Community-Based
Intervention Overview and Setting	Event-based selection (hospitalization). Focus on transition from inpatient to post-acute setting(s).	Convenience sample. Focus on community or home settings (ambulatory care, long-term services and supports).
Evaluation Design	Serial cross-section. Compare pre- and post- intervention treatment group with pre- and post-intervention comparison group.	Longitudinal cohort. Compare treatment cohort at two or more points in time.
Analytic Method	Time series; difference in differences	Time series; difference in differences
Unit of Analysis	Beneficiary-episode	Beneficiary
Comparison Group	Provider level. Beneficiary-episodes from similar, non-participating facilities or peer providers. Standard Mortality Ratio (SMR) weighting.	Geographic area (comparable counties). Beneficiaries receiving usual source of care, identified from claims. Propensity score matching.

Post-Acute (Hospital) Interventions. Participants are enrolled in PAC programs when they are admitted to (or discharged from) a hospital inpatient setting. Hence, beneficiary-episode is the unit of analysis. The comparison group consists of admissions to (or discharges from) non-participating facilities, during both the pre- and post-intervention periods. An external comparison group is created from episodes of care that meet the inclusion criteria for the intervention, seen by peer providers that match the awardees on a set of pre-intervention provider-level variables.[56]

We combine the data for the awardee and comparison facilities pre- and post-intervention, to construct a serial cross-section study. In this design, we compare episodes of care occurring during the calendar period before intervention implementation, to episodes occurring during the calendar period after intervention implementation. Difference-in-differences (DID) methods compare average outcomes between the awardee program and comparison groups in these pre- and post- intervention periods. Core measures include 30-day hospital readmission rate, 90-day hospital readmission rate, 90-day ED visit rate,

[56] Peer providers were selected through discussions with awardees and include providers similar to awardee providers.

and 90-day total cost of care. Supplemental measures for selected awardees, include primary care follow-up within 7 and/or 30 days of hospital discharge.

Ambulatory Care (Community-Based) Programs. Participants in ambulatory care interventions are not enrolled based on an acute hospitalization event, but typically are patients presenting to the awardee program site during the intervention period, meeting the specified eligibility criteria outlined by the awardee. We create comparison groups using claims data sources, based on our understanding of the awardee's treatment population and related demographic characteristics, clinical characteristics, and health service utilization patterns. At this point in our evaluation, claims data are not available to identify a comparison group for every ambulatory care awardee intervention. For this reason, we present results without comparison group for some of the awardees. As timely claims data become available, we will include claims-based comparison group for these awardees in future reports.

Our analysis for ambulatory care/community-based awardees follows patient cohorts and comparison group members longitudinally (across time periods) both before and after beneficiary enrollment in the program. In this report, we study changes in core measures, computed for each patient prior and subsequent to their enrollment in an HCIA program. The core measures include 30-day hospital readmissions per quarter, all-cause hospitalizations per quarter, ambulatory care-sensitive (ACS) hospitalizations[57] per quarter, and total cost of care in the quarter. For certain awardees we include supplemental measures such as hospitalizations, ED visits, and total cost of care in the final 30 days of life.

Analytic Design: Our design of the analysis for each awardee begins with an assessment of data quality and adequacy, considering the following factors:

Evaluability. For awardees that NORC has neither timely claims data nor program data to date, we present a brief status update on prospects for completing our evaluation.

Usability. For awardees that have enrolled a substantial population of Medicaid participants and for whom timely Alpha Medicaid Analytic eXtract (Alpha-MAX) data or Medicaid data from another source are available to support their evaluation, we conduct a usability analysis, to assess the completeness and representativeness of these Medicaid data files.

Eligibility Database (EDB) Matching. For awardees with low sample sizes that have provided us usable finder file, we link these files to available Medicare or Medicaid claims data to assess the number of matched beneficiaries that will ultimately constitute the analytic sample.

Exhibit C.3 summarizes the type of analysis presented in this report.

[57] See http://www.qualityindicators.ahrq.gov/modules/pqi_resources.aspx for definition and specification of the measure.

Exhibit C.3: Types of Analyses for Claims-Based Measures in Evaluation Reports

Awardee	Claims Data Source(s)	Analyses Included in NORC Report		
		Data Assessment (EDB = Eligibility Database)	Modeling (DID = Difference in Differences; TS = Time Series)	Survey Findings
Beth Israel Deaconess Medical Center	Medicare		DID with core & supplemental measures (primary care visit within 30 days post-discharge)	
California LTC Education Center	Medicaid (Medi-Cal), health plan & program data	Usability analysis		
Community Care of North Carolina	Medicaid	Evaluability analysis		Usability analysis
Courage Kenny Rehabilitation Institute	Medicaid			NORC consumer experience survey
Developmental Disabilities Health Services	Medicaid	EDB matching		
Johns Hopkins University	Medicare & Medicaid		TS with core & supplemental measures (primary care visit within 30 days post-discharge)	
		EDB matching		
Johns Hopkins School of Nursing	Medicare & Medicaid	EDB matching		
LifeLong Medical Care	Medicare, Medicaid, & health plan (Alameda Alliance for Health)	Usability analysis		
Northland Healthcare Alliance	Medicare & Medicaid		DID with core & supplemental measures (primary care visit within 30 days post-discharge)	
Palliative Care Consultants of Santa Barbara	Medicare		DID with core measures	
Pittsburgh Regional Health Initiative	Medicare		DID with core & supplemental measures (primary care visit within 30 days post-discharge)	
Providence Portland	Medicare & Medicaid		TS with core measures & DID with core measures for the HRP program	
South Carolina Research Foundation	Medicare	EDB matching		
St Francis Healthcare Foundation of Hawaii	Medicare		TS with core measures, and an internal comparison group	
			TS with core measures	
Sutter Health	Medicare		Differences with core measures	
			TS with core & supplemental measures	
University Emergency Medical Services	Medicaid	Usability analysis	DID with core & supplemental measures	
University of Arkansas for Medical Sciences	No claims available			NORC workforce trainee survey
University of Iowa	Medicare		DID with core & supplemental measures (primary care visit within 30 days post-discharge)	

Awardee	Claims Data Source(s)	Analyses Included in NORC Report		
		Data Assessment (EDB = Eligibility Database)	Modeling (DID = Difference in Differences; TS = Time Series)	Survey Findings
University of New Mexico	Medicaid	Usability analysis		Awardee workforce survey
University of North Texas Health Science Center	Medicare		TS with core measures	
		EDB Matching		
University of Rhode Island	Medicaid		DID with core measures	
University of Texas Health Science Center at Houston	Medicaid		Differences with core measures	
Vanderbilt University Medical Center	Medicare		DID with core and supplemental measures (primary care visit within 30 days post-discharge)	

Data Collection Update

Our analyses require two kinds of information from awardees: finder files identifying program participants to match with Medicare or Medicaid claims data and analytic files of program data such as self-monitoring measures, electronic health record (EHR) data, or patient-reported outcomes. In order to obtain finder files and program data from awardees, we entered into data sharing agreements, either data use or business associate agreements (DUA or BAAs), with awardees and their partnering organizations.

For the 18 awardees in our portfolio whose participants include Medicaid enrollees, our evaluation must secure access to Medicaid data. Exhibit C.4 below summarizes Medicaid data sources identified for these awardees and the status of efforts to obtain these data.

- Six awardees are providing us with Medicaid data from their plan partners (California LTC Education Center, LifeLong Medical Center/Alameda Alliance, and Providence Portland) or Medicaid data that they have from the state (Courage Kenny, University of New Mexico, University of Texas- Houston).
- For two awardees, we will receive Medicaid Statistical Information System (MSIS) data from Maryland (Johns Hopkins University, Johns Hopkins University School of Nursing).
- For one awardee, our subcontractor JEN Associates has permission from the State to share analyses conducted under their contract with the University of Rhode Island.

For the remaining eight awardees, we propose to use Alpha Medicaid Analytic eXtract (Alpha-MAX). Current Alpha-MAX data through 2013 is available for only one of these awardees (University Emergency Medical Services). We are closely monitoring the timing and availability of Alpha-MAX for seven other awardees. Alpha-MAX is only available for 2011 in North Carolina, and there have been delays with Alpha-MAX production for that state, due to a change in the Medicaid Management Information System (MMIS) vendor. This may affect our evaluation for Community Care of North Carolina. However, the awardee has agreed to share analysis from their work. For the one awardee with

timely Alpha-MAX data, we have begun our usability analysis, to prepare for conducting their evaluation in forthcoming reports.

Exhibit C.4: Status of Medicaid Data Sources

Awardee	State(s)	% Medicaid Enrollees for Awardee	Proposed Source of Medicaid Data	Medicaid Access Status
CLTCEC	CA	100%	Plan Partners (Contra Costa, IHEP, Molina, Care 1st, LA Care)	Received sample files from IHEP, Molina, Care 1st, Contra Costa through 4/15/15
CCNC	NC	100%	Alpha-MAX (2011)	Timely Data Unavailable
CKRI	MN	100%	MN Department of Human Services	Allina (Courage Kenny's Corporate Organization) has access to MN Department of Human Services. Data have been requested for evaluation.
DDHS	NJ	96%	Alpha-MAX (2011)	Timely Data Unavailable
	NY		Alpha-MAX (2011 – 2013)	Alpha-MAX Usability testing
JHU	MD	36%	MD State	Hilltop will provide by November 2015
JHU SON	MD	100%	MD State	Hilltop provided October 2015
LifeLong	CA	100%	Plan partner (Alameda Alliance)	Received updated sample files from Alameda on 4/15/15
Northland	ND	26%	Alpha-MAX (2011)	Timely Data Unavailable
PCCSB	CA	22%	Alpha-MAX (2011)	Timely Data Unavailable
PPMC	OR	95%	Plan Partner (Health Share of Oregon)	Updated files received from Health Share on 5/5/15
SCRF	SC	82%	Alpha-MAX (2011 – 2012)	Timely Data Unavailable
St Francis	HI	24%	Alpha-MAX (2011)	Timely Data Unavailable
Sutter Health	CA	14%	Alpha-MAX (2011)	Timely Data Unavailable
UT Houston	TX	88%	Texas MMIS Data from Awardee	Obtained Texas MMIS data for treatment and original control group from awardee
UEMS	NY	100%	Alpha-MAX (2011 – 2013)	Testing usability of Alpha-MAX for awardee
U Iowa	IA	16%	Iowa MMIS Data from Awardee	Submitted letter to the state of Iowa, requesting access to IA MMIS data to which Awardee has access; state denied the request
U New Mexico	NM	100%	Alpha-MAX (2011 – 2013)	U New Mexico contractor, NYU, will supply analytic data set. Testing usability of Alpha-MAX for Awardee
URI	RI	100%	RI MMIS Data with JEN Associates	Reuse of RI MMIS data to which JEN Associates has access for treatment group; Medicare benchmarks for comparison

In the subsequent sections, we summarize for both the PAC and ambulatory awardees the details of our methods to assess program effectiveness using claims data, including data sources, specification of measures, approach to identifying comparison groups, use of propensity score methods to ensure

similarity between the treatment and comparison groups, and specification of analytic models to assess program impacts.

Post-Acute Care Awardees

Participants are enrolled in these intervention programs when they are admitted (or discharged) from an inpatient facility, typically a hospital but sometimes a skilled nursing facility (SNF). Although each intervention focuses on different populations and uses different approaches, they all have the common goals of improving health, increasing quality of care, and decreasing cost in the post-acute care period. Since each episode of acute/post-acute care provides the awardee an opportunity to intervene to improve outcomes, we use the beneficiary-episode as the unit of analysis for these awardees. Since patients must be admitted to a participating inpatient facility to be eligible for the intervention, we can establish a baseline time period for patients admitted to (or discharged from) the awardee facilities prior to the start of the HCIA program (pre-intervention period). Similarly, a comparison group is comprised of admissions to (or discharges from) non-participating facilities during both the pre and post-intervention periods.

Data Sources and Populations

The primary source for evaluation analyses is the Medicare and Medicaid data files hosted in the CMS Virtual Research Data Center (VRDC). The VRDC includes all historical and current Medicare claims and enrollment data, which are updated on a monthly basis. For the analyses in this report, we included Medicare claims prior to October 1, 2014, allowing for a 90-day run out period. Due to the standard delay between the provision of a service and the submission of a claim (usually between three to six months), it is possible some claims for services occurring after September 2014 (when we extracted the claims from the VRDC) have not yet been filed. Thus, the last quarter included in our analysis is Quarter 3 of 2014 (through September 30, 2014).

Awardee Intervention and Pre-Intervention Groups. Awardees provide a finder file of beneficiaries participating in their interventions. We use these files to identify program participants for each intervention. Beneficiary-episodes of care in the finder file are included in the awardee post-intervention group if they occur after implementation at the awardee program site.

As a historical comparator, we also select a pre-intervention period group for the awardee. The pre-implementation treatment group is selected from the two years prior to implementation of the intervention and consists of beneficiary-episodes at the awardee site that meet the inclusion criteria for the intervention. The reason to include the pre-implementation treatment group is to allow us to study changes in outcomes at the awardee site for episodes of care prior to and after the implementation of the HCIA award. Our comparison group includes beneficiary-episodes from comparison sites for the two years prior to implementation of the intervention (pre-implementation period) and continues through the implementation period (post-implementation period).

Analytic File Construction. We integrate claims and Medicare enrollment records for all the Medicare beneficiaries with inpatient admissions for the awardee program and prepare beneficiary-level

longitudinal summary records. Claims types include Inpatient, Hospice, Home Health, Skilled Nursing Facility, Outpatient Hospital, Physician-Supplier, and Durable Medical Equipment claims.

From the collected beneficiary claims, we create hospital episode-level summary records for the post-acute period. For the purpose of counting inpatient hospital readmissions during the post-acute period we gather multiple acute care hospital claims into single-stay episodes if the dates of stay were contiguous. We use the same procedure for hospital admissions in the year prior to the qualifying admission. The core information for an episode includes the start date, end date, and attributed hospital.

The episode records captured information in the periods before, during, and after the qualifying (index) admission. The design of the analytic records includes the following components:

- patient demographics/region, including age, gender, race, ethnicity, and county or zip code of residence;
- beneficiary administrative status at the time of the episode, denoting whether the beneficiary was eligible for Medicare due to age, disability, or end-stage renal disease (ESRD);
- hierarchical condition categories (HCC) flags and scores for the 12 months prior to the episode start date;
- hospital episode characteristics for length of stay, cost, and admission condition;
- utilization of hospital, SNF, and outpatient emergency room care in the 12 months prior to the index hospitalizations; and
- utilization of hospital and outpatient emergency room care, and total cost of care in the 90 days following hospital discharge.

Comparison Groups. In this report we include an external comparison group for six PAC awardees: BIDMC, UIHC, J-CHiP, PRHI, U North Texas, and VUMC. For each awardee, we use a three-stage process to define the comparison group.

- Identify sampling frame: select facilities/areas comparable to program implementation site.
- Limit to qualified beneficiary-episodes: apply awardee program enrollment criteria to restrict the comparison pool to beneficiary-episodes with similar qualifying criteria to those in the intervention group.
- Select similar beneficiary-episodes: use propensity score methods to weight[58] treatment and comparison groups on potential confounding factors.

Identify Sampling Frame: The first step to selecting a comparison group is to select the sampling frame. Variation in utilization and costs across geographic regions and providers is well documented.[59] This is a

[58] We use propensity score weighting for PAC awardees since we use a serial cross-section design where we compare patient-episodes in the pre and post-intervention period.

[59] Fisher, Elliott S., et al. "The implications of regional variations in Medicare spending. Part 1: the content, quality, and accessibility of care." *Annals of internal medicine* 138.4 (2003): 273-287. (2) Fisher, Elliott S., et al. "The implications of regional variations in Medicare spending. Part 2: health outcomes and satisfaction with care." *Annals of internal medicine* 138.4 (2003): 288-298. (3) Welch, H. Gilbert, et al. "Geographic variation in diagnosis frequency and risk of death among Medicare beneficiaries." *JAMA* 305.11 (2011): 1113-1118.

potential source of bias for our evaluation if not well controlled. Therefore, we explicitly consider geographic and provider-level factors in selecting the sampling frame. Exhibit C.5 summarizes the sampling frame and the approach to identifying comparison providers/areas for the six PAC awardees.

Limit to qualified beneficiary-episodes: After identifying comparison providers, we select all beneficiary-episodes for the comparison providers identified from Medicare inpatient and outpatient claims. Hospitalizations are identified based on the date of discharge on Medicare inpatient and outpatient files, after excluding discharges that were transfers to another acute care facility. Any hospitalization meeting the awardee-specific inclusion and exclusion criteria, and occurring during the two years prior to implementation of the innovation program (as defined by the awardee in their quarterly report), is included as a pre-intervention observation. The post-intervention period is limited to those hospitalizations occurring after implementation of the innovation program and prior to October 2014.

Exhibit C.5: Sampling Frame for PAC Comparison Groups

Awardee	Sampling Frame	Comparison Providers/Areas
BIDMC	Beneficiary-episodes referred to BIDMC from non-affiliated primary-care practices	All beneficiary-episodes with a physician visit to any non-affiliated physician practice within three months of admission to BIDMC
UIHC	Beneficiary-episodes from University of Iowa hospital residing in comparison counties	Counties in Iowa: Buchanan, Fayette, Floyd, Mahaska, Lucas, Monroe, Davis, Iowa, Franklin, Grundy, Hardin, Jones, Delaware, Jackson, Mitchell, Appanoose, Clayton, and Howard County
J-CHiP	Beneficiary-episodes from three comparison hospitals	The University of Maryland Medical Center, St. Agnes Hospital and Franklin Square Hospital[60]
PRHI	Beneficiary-episodes for AMI, COPD, or CHF from ten comparison hospitals	Jameson Memorial Hospital, Meadville Medical Center, Monongalia County General Hospital, St. Mary's Medical Center, Saint Vincent Health Center, York Hospital, ACMH Hospital, St. Clair Memorial Hospital, Riddle Memorial Hospital, and Mount Nittany Medical Center.
U North Texas	Beneficiary-episodes from six partner hospitals discharged to seven comparison SNFs with characteristics similar to those of Brookdale's SNFs	Partner hospitals: Baptist Health, Tampa General, St. Vincent's Health System (Ascension Health) Southside, St. David's Medical Center, St. David's South Austin Medical Center, St. David's North Austin Medical Center Comparison SNFs: Avante Villa at Jacksonville Beach, Fleet landing, Life Care Center of Jacksonville, Nuvista Living at Hillsborough Lakes, Estrella Oaks Rehab and Care Center, Park Bend SN Health Center, and Senior Care of West Oaks
VUMC	Beneficiary-episodes from VUMC discharged to a non-participating SNF	All beneficiary-episodes with a SNF admission to any non-participating SNF immediately following discharge from VUMC

Select similar beneficiary-episodes: We use propensity score models to weight the treatment and comparison beneficiary-episodes based on their propensity scores to ensure that patients in the two groups are similar with respect to observed covariates. Since our goal is to measure the average treatment effect on the treated (ATT), rather than average treatment effect (ATE), we choose PS methods that allow us to measure ATT within a DID framework. We use standard mortality ratio (SMR) weighting to estimate ATT since this method maximizes the study's power to detect differences by retaining all awardee

[60] JHH is similar to the University of Maryland Medical Center, while Bayview Medical Center is similar to St. Agnes Hospital and Franklin Square Hospitals, in case mix and patient demographics.

beneficiary-episodes in our analysis. Since it is possible that beneficiary-episodes at the awardee site in the pre- and post-intervention period may be systematically different[61], we use a two-step process to assess whether such systematic differences exist, and implement the appropriate weighting method:

- Empirically compare differences in beneficiary-episode covariates by estimating the standardized difference in the HCC scores for beneficiary-episodes (i.e., a proxy for severity) in the pre- and post-intervention treatment populations. If the standardized difference is greater than ±0.1, we deem the two groups to be meaningfully different. On the other hand, if the standardized difference is less than ±0.1, we deem the two groups to be similar.
- Estimate the propensity score as the probability of a patient being enrolled in the awardee's program, conditional on the patient's covariates. If the pre- and post-intervention groups are meaningfully different, we use multinomial logistic regression to estimate propensity score. If the two aforementioned populations are similar, we use logistic regression to estimate the propensity score. In other words, if the case-mix for episodes at the awardee site is significantly different between the pre- and post-intervention periods, we estimate the propensity score model as the likelihood of an episode being seen at the awardee site in the post-intervention period; otherwise we estimate the propensity score model as the likelihood of an episode being seen at the awardee site in either period. We then compute SMR or relative weights as shown in Exhibits C.6 and C.7.

In this report, we use SMR weights for VUMC and U North Texas, and relative weights for BIDMC, PRHI, J-CHiP, and UIHC.

Exhibit C.6: SMR Weights from Logistics Propensity Score Model

Site	Pre- or Post-HCIA
Awardee	1
Comparison	$1 / (1- e_{treatment}(X_i))$

NOTE: $e_k(X_i)$: probability of being in group k for beneficiary-episode i given a set of observed covariates X.

Exhibit C.7: Relative Weights from Multinomial Logit Propensity Score Model

Site	Pre-HCIA	Post-HCIA
Awardee	$e_{post\text{-}treatment}(X_i) / e_{pre\text{-}treatment}(X_i)$	1
Comparison	$e_{post\text{-}treatment}(X_i) / e_{pre\text{-}comparison}(X_i)$	$e_{post\text{-}treatment}(X_i) / e_{post\text{-}comparison}(X_i)$

NOTE: $e_k(X_i)$: probability of being in group k for beneficiary-episode i given a set of observed covariates X.

Variables in the propensity score model include, but are not limited to: beneficiary-episode demographics, clinical covariates, morbidity, prior utilization, and characteristics of provider/area. The set of variables differs by awardee, and is reported in the awardee chapters in Appendix F. Where $\mathbf{T_i}$ is the probability of being a treatment group, $\mathbf{Beneficiary\text{-}episode_i}$ is a vector of patient characteristics, and $\mathbf{Practice/Area_i}$ is

[61] Under this circumstance, our propensity model will have to account for four distinct groups: pre-HCIA comparison, post-HCIA comparison, pre-HCIA intervention, and post-HCIA intervention group.

a vector of characteristics of the practice or the area for the beneficiary. The following specification was used for the propensity score models:

$$\text{Logit}[\Pr(T_i=1)] = \beta_0 + \beta_1 \text{Beneficiary-episode}_i + \beta_2 \text{Practice/Area}_i$$

We assess and confirm both common support as well as covariate balance between the treatment comparison group patients before and after applying propensity score[62]. Further analyses of the effects of the treatment are conducted with the treatment group and the weighted comparison group.

Measure Specification

In this report, our results focus on three core measures that CMS has identified: readmissions, emergency department visits, and total cost of care. Below, we provide details on the specification of each of these measures for the post-acute awardees for which analysis has been performed to date.

Post-discharge Readmissions are defined as the average number of participants with a re-hospitalization within 30 days or 90 days of a qualifying (index) hospital discharge per 1,000 hospital discharges. We include re-hospitalizations for any cause, both planned and unplanned, at any hospital from the Medicare inpatient claims file. The readmission measures exclude observation stays found on the Medicare outpatient claims file that did not result in an inpatient admission. For each index discharge, we compute the number of readmissions occurring within 30 and 90 days of discharge.

Post-discharge Emergency Department Visits are defined as the average number of participants with an ED visit or hospital observation stay in the 90 days following hospital discharge per 1,000 index hospital discharges. ED visits and observation stays are identified using Medicare outpatient hospital claims from appropriate revenue center codes. We exclude ED visits and observation stays that resulted in an inpatient hospitalization, to avoid double-counting readmissions as ED visits. We also count ED visits and observation stays occurring on the same date as a single event. For each index discharge, we compute the number of ED visits and observation stays occurring within 90 days of discharge. We included ED visits occurring outside of the calendar quarter, but within 90 days of discharge in the calculation.

Post-discharge Total Cost of Care includes all Medicare Parts A and B payments for claims incurred within 90 days of index hospital discharge. It is expressed as the average (mean) total cost of care. We include costs related to any visit, admission, or service provided to a beneficiary and beginning within 90 days of discharge from the index hospitalization. Any Medicare hospital payments attributable to the index hospitalization are excluded from this total cost of care measure. The total cost of care for each beneficiary-episode is attributed to the calendar quarter of the index hospitalization discharge. Total cost of care for beneficiary-episodes with partial episode length (<90 days) is inflated to the length of the entire episode, for beneficiary-episodes where the beneficiary was alive at the end of the episode period. Costs are expressed in 2013 dollars after adjusting for the Medical Consumer Price Index. Because we select comparison providers from the same region as the awardee program, we do not standardize costs

[62] We assess common support by visually inspecting overlap in distribution of estimated propensity scores across treatment and comparison groups. We compute standardized differences in baseline covariates between treatment and comparison groups to assess balance.

across inpatient providers in our specifications. We include cost related to any visit, admission, or service provided to a beneficiary based on whether the "to-date" of the claim, or the date on which the service (e.g. discharge) was completed, occurred within 90 days of discharge from the index hospitalization.

Practitioner Visit within 7 and 30 Days of Discharge is defined as a**n** office visit occurring within 7 and 30 days of a qualifying (index) hospital discharge per 1,000 hospital discharges. An office visit is defined as a visit to any primary care or specialist physician, or other independent practitioner such as a nurse practitioner or to a federally qualified health center, as indicated by a professional claim with a Current Procedural Terminology (CPT) code for evaluation and management or Health Care Common Procedure Coding System (HCPCS) code for all-inclusive clinic visit. For each index discharge, we identify professional claims with relevant CPT or HCPCS codes occurring within 7 and 30 days of discharge. Although the index hospitalization must have occurred during the quarter, an office visit need not have occurred during the same calendar quarter. Instead, it must only have fallen within 7 and 30 days of discharge.

In future reports we will expand the scope of our analyses of program effectiveness to include more measures specific to the awardees' programs, and also modify the time frames of existing measures as appropriate to the awardee program being evaluated.

Analytic Methods

As described in the report, we use difference-in-differences (DID) methods to estimate the impact of the PAC awardee programs on measures of utilization and cost. The primary parameter of interest is the DID (or double difference), the difference in average outcome between the awardee treatment group and a comparison group before implementation of the intervention, minus the difference in average outcome between the awardee treatment group and a comparison group after implementation of the intervention. This construction allows us to study the impact of an awardee's program compared to similar provider organizations—estimating an average treatment effect for the program while limiting the influence of selection bias (using the same groups pre- and post-intervention implementation) and secular trends (by analyzing the comparison and treatment groups during the same calendar time period).

The ability to draw a causal conclusion is a key advantage of DID methods; however the validity of these conclusions rests on several important assumptions. The two central assumptions are that any differences between groups are additive and constant over time. The factors influencing outcomes in each group do not change over time, and their impact does not change, save for the intervention itself. Violation of either assumption could bias the results of the DID models.

For each awardee, we estimate the double difference by employing generalized estimating equations (GEEs) or generalized linear models (GLMs) when GEE models did not converge. These regression models offer us flexibility to allow for modeling dependent variables that are either continuous (e.g., cost of care), or binary (e.g. any ED visit within 90-days), and take varying functional forms such as binomial (e.g. any ED visit within 90 days) or gamma (e.g. cost of care). The GEE models have an additional advantage in that they are able to account for correlated data structures including clustering (e.g., by

provider site) or longitudinal data (e.g., observations over multiple quarters), and parameter estimates are robust even when the covariance structure is unknown or incorrectly specified.

We use the following functional forms for the dependent variables in our models:

- *Binomial distribution with log-link:* For likelihood of readmissions, ED visits, primary care follow-up visits
- *Gamma distribution with log-link:* For total cost of care. We first convert all costs to 2013 dollars and then use a gamma distribution with a log link to model costs. This form allows us to account for the skewed distribution of cost across episodes.

Both the GEE and GLM models are specified in the same manner and have the same interpretation of parameter estimates.

For PAC awardees with external comparison groups: To answer the research question on program impact, we compare the change in outcomes between treatment and comparison group, across the entire post-intervention period and the pre-intervention period using a difference-in-differences (DID) model. The results of this model are displayed in a table within the awardee chapter. In the DID model beneficiary-episodes are weighted based on their SMR or relative propensity score weight. The specification for the DID model assessing the impact of the entire intervention on outcomes post-implementation is given as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2). Using the total cost of care as example, β_3 provides an estimate of how much more (or less) episodes from the awardee program facilities cost versus the comparison group, during the post-intervention period, after considering the differences between the awardee and comparison groups in the pre-intervention period.

For PAC awardees without external comparison groups: To answer the research question on program impact for PAC awardees without external comparison groups, we employ time-series analyses comparing the change in outcomes for beneficiary-episodes discharged from the awardee site in the periods *before* and *after* implementation of the intervention. In the two time periods, we use 90-day post-discharge beneficiary-episodes before and after implementation of the program as the unit of analyses. The time-series models are specified as:

$$Y_{it} = \beta_0 + \beta_1 \text{ Post-Period}_t + \beta_3 \text{ Beneficiary-Episode}_i + \varepsilon_{it}$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary-episode in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention implementation period and $\boldsymbol{\beta_1}$ is the effect observed after program implementation; *Beneficiary-Episode* is a vector of beneficiary-episode demographic and clinical

variables. In our models, β_1 is the effect of the program on beneficiary-episode outcomes over the entire post-intervention period.

The beneficiary-episode covariates included in our DID and time-series models are beneficiary's age, gender, race, dual eligibility status, and disability status at the time of the index episode. We also include clinical beneficiary-episode covariates for risk adjustment, including hierarchical chronic condition (HCC) categories from the CMS HCC Model for diagnoses one year prior to start of the index episode; [63] number of all-cause hospital admissions and avoidable ED visits in the year prior the index episode; type of index hospital episode (e.g., COPD, CHF, or AMI for PRHI); and severity of index episode (e.g., major conditions and comorbidities versus conditions and comorbidities; and no conditions and comorbidities[64]).

Ambulatory Care Awardees

Unlike the post-acute interventions, the ambulatory care awardee programs do not identify their participants based on events like a hospitalization. In general, these programs focus on improving health, increasing quality of care, and decreasing cost for patients in the outpatient setting. Program participants are typically a convenience sample of patients presenting to the awardee program site during the intervention period. Thus, participants for these awardees cannot be easily identified from claims rules alone and are only identifiable when awardees provide us with finder files containing claims-linkable patient identifiers.

Data Sources and Populations

As for PAC awardees, the primary data source for evaluation of Community awardees is the Medicare and Medicaid data repository hosted in the CMS Virtual Research Data Center (VRDC). The VDRC includes all historical Medicare claims and enrollment data and is updated on a monthly basis. Using the finder files provided by the awardees, we identify program participants and their initial enrollment date. We then integrate claims and Medicare enrollment records for all the Medicare beneficiaries in the treatment group by enrollment quarter, beginning with the quarter of initial enrollment in the intervention to create a beneficiary-level longitudinal summary record. We also look back two years (eight quarters) prior to the quarter of initial enrollment in the intervention. For each person in the finder file, this file contains a separate record for every quarter of observation and the unit of analysis was the beneficiary quarter. We attribute claims to a beneficiary quarter if the date of service falls within the quarter.

The design of the analytic records includes the following components:

- patient demographics/region;
- beneficiary administrative status at enrollment;

[63] CMS HCC Model, 2013. Available at : http://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors-Items/Risk2013.html?DLPage=1&DLSort=0&DLSortDir=descending

[64] Presence of a major condition and comorbidity (MCC) or conditions and comorbidity (CC) is used as an adjustment factor for differences in morbidity.

- hierarchical condition categories (HCC) flags and scores for the 12 months prior to enrollment;
- utilization of hospital, SNF, and outpatient emergency room care in the 12 months prior to enrollment; and
- utilization of hospital and outpatient ED care, and total cost of care[65] during the quarter.

Comparison Groups. In this report we include a comparison group for seven ambulatory care awardees: LifeLong, Northland, PCCSB, Providence, Sutter Health, UEMS, and UT Houston. Since UT Houston's design included a randomized control group we have used these control patients as the comparisons group in our analyses. For each of the other awardees we use a three-stage process to define the comparison group:

- Identify sampling frame: select facilities/areas comparable to program implementation site.
- Limit to qualified beneficiaries: apply awardee program enrollment criteria to restrict comparison pool to beneficiaries with similar qualifying criteria to those in the intervention group.
- Select similar beneficiaries: use propensity score methods to match treatment and comparison groups on potential confounding factors.

Identify Sampling Frame: The first step to selecting a comparison group is to select the sampling frame. We explicitly consider geographic and provider-level factors in selecting the sampling frame. Exhibit C.8 summarizes the sampling frame and the approach to identifying comparison providers/areas for the seven ambulatory awardees.

Exhibit C.8: Sampling Frame for Ambulatory Comparison Groups

Awardee	Sampling Frame
LifeLong	Patients from the three intervention clinics not enrolled in the program in three clinics
Northland	Beneficiaries in geographic areas adjacent to the NCCS service area. Participants are matched within each zip code
PCCSB	Beneficiaries in similar geographic location66 as the treatment group
Providence Portland	Medicaid beneficiaries enrolled during the same time period as in the Health Commons project but received no services from the Health Resilience Specialists
Sutter Health	Medicare beneficiaries who live in similar geographic areas, who also died or received hospice care during the same time period (2013 and 2014)
UEMS	Medicaid beneficiaries aged 18 years of age and older residing in comparison zip codes areas, who live in the community, and had an emergency department (ED) visit in 2012, and at least 2 additional ED visits in the previous 12 months
UT Houston	Medicaid beneficiaries in awardee's initial RCT control group

Limit to qualified beneficiaries: Once we have identified the comparison group, we select all beneficiaries residing in the selected geographic area or receiving treatment from the selected comparison practices. We identify these beneficiaries using Medicare enrollment and claims data. We select all

[65] Includes Medicare A and B payments.

[66] To identify comparison counties, we used propensity models to compare treatment beneficiaries' county of residence to other counties. The propensity models include county level factors such as geographic location, demographic composition, socio-economic status, Medicare HMO penetration, Medicare costs and utilization, and availability and use of inpatient, hospice, and palliative care services. We source county level characteristics from the CY2013 Area Resource File (ARF), and CY2012 State-county CMS geographic variation public use files (PUF).

beneficiaries who enroll prior to October 2014 and meet the awardee-specific inclusion and exclusion criteria.

Select similar beneficiaries: we use propensity score models to match treatment group beneficiaries to beneficiaries in the comparison group sample frame. Where $\mathbf{T_i}$ is the probability of being a treatment group, $\mathbf{Patient_i}$ is a vector of patient characteristics, and $\mathbf{Practice/Area_i}$ is a vector of characteristics of the practice or the area for the beneficiary. The following specification was used for the propensity score models:

$$\text{Logit}[\Pr(T_i=1)] = \beta_0 + \beta_1 \text{Patient}_i + \beta_2 \text{Practice/Area}_i$$

Exhibit C.9 summarizes the propensity matching method used to match treatment group beneficiaries to beneficiaries in the comparison group sample frame.

Exhibit C.9: Propensity Score Approach for Ambulatory Comparison Groups

Awardee	Propensity Matching Method	Covariates
LifeLong	Matching	Demographics, prior utilization
Northland	Matching	Demographics and disability, risk scores, prior utilization
PCCSB	Matching	Demographics and disability, risk scores, prior utilization
Providence	Mahalanobis Metric Matching[67]	Demographics and disability, risk scores, prior utilization
Sutter Health	Matching	Demographics and disability, risk scores, prior utilization, common HCC flags
UEMS	Matching	Demographics and disability, risk scores, prior utilization
UT Houston	No propensity approach used because data is from a randomized control trial	

We assess and confirm both common support as well as covariate balance between the treatment and comparison group patients before and after applying the propensity score[68]. Further analyses of the effects of the treatment are conducted with the treatment group and the weighted comparison group.

Measure Specification

In this report our results focus on the core measures that CMS has identified. We have defined these measures under the PAC awardee section. Our approach for ambulatory awardees is similar but is based on patients as the unit of analysis, rather than episode. Time is exposure time to the intervention, rather than calendar time. We report the following measures for ambulatory awardees for each patient-quarter prior and subsequent to enrollment in the intervention:

- All-cause hospitalizations per quarter: Measured as number of participants with hospitalizations per 1000 patients

[67] In Mahalanobis metric matching, we specify a set of variables and calculate the Mahalanobis distance between the treatment and comparison group members. The comparator with the smallest distance is selected as the match. By combining Mahalanobis with propensity scores, we are able to incorporate propensity scores into the matching process.
[68] We assess common support by visually inspecting overlap in distribution of estimated propensity scores across treatment and comparison groups. We compute standardized differences in baseline covariates between treatment and comparison groups to assess balance.

- ACS hospitalizations per quarter: Measured as number of participants with ACS hospitalizations per 1000 patients
- Readmissions per quarter: Measured as number of participants with 30-day readmission per 1000 patients
- ED visits per quarter: Measured as number of participants with ED visits or observation stays (not resulting in inpatient hospitalizations) per 1000 patients
- Total Medicare cost of care per quarter: Measured as average (mean) Medicare costs per patient, expressed in 2013 dollars, inflated for any partial quarters of enrollment.

Analytic Methods

For awardees with comparison groups, we use DID models to look at changes in participants outcomes before and after enrollment in the program, relative to a comparison group. For those awardees where we do not yet have a comparison group, we conduct a time-series analysis, looking at changes in outcomes over time for the period prior to enrollment and after program enrollment for participants enrolled in their interventions. Duration is categorized by quarters. We obtain the five outcome measures detailed above for each of the eight patient-quarters prior to enrollment and all patient-quarters after enrollment.

For each awardee, we estimate the average outcome measure by employing population averaged generalized estimating equations (GEEs). This class of regression model is flexible, and allows for the dependent variable to take different functional forms. A key advantage of this class of models is the ability to account for correlated data structures including clustering (e.g., by provider site) or longitudinal data (e.g., observations over multiple quarters), and parameter estimates are robust even when the covariance structure is unknown or incorrectly specified.

We use the following functional forms for the dependent variables in our models:

- *Binomial distribution with log-link:* For likelihood of hospitalizations, ACS hospitalizations, readmissions, and ED visits.
- *Gamma distribution with log-link:* For total cost of care. We first convert all costs to 2013 dollars and then use a gamma distribution with a log link to model costs. This form allows us to account for the skewed distribution of cost across episodes. In instances where a gamma distribution was not the correct functional form for the data (e.g. Providence) we used a log-linked Poisson distribution,

We modify the covariance structure to account for the repeated measures over time for each participant (each quarter of participation in the intervention) and obtain clustered standard errors at the patient level.

Awardees with comparison groups: To answer the research question on program impact for awardees using comparators, we compare the change in outcomes between the treatment and comparison groups across the entire post-intervention enrollment period and the pre-intervention period. The results are presented in a table in the awardee chapters. The DID model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Intervention} + \beta_3 \text{Treatment}_{ij} * \text{Intervention} + \beta_4 \text{Beneficiary}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect after enrollment in the program (β_3), after adjusting for baseline differences between the treatment and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Awardees without comparison groups: To answer the research question on program impact for awardees without comparison groups, we employ time-series analyses comparing the change in outcomes for program participants in the periods *before* and *after* enrollment in the program. In the two time periods, we use repeated measures on program participants, obtained per quarter, before or after enrollment in the program. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta Participant_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention period and **α** is the effect observed after enrollment in the program; *Participant* is a vector of participant demographic and clinical variables; and **β** is a vector of effects corresponding to the relevant participant variables in the models. In our models, **α** is the effect of the program on outcomes over the entire post-intervention period.

The patient-level covariates included in our DID and time-series models are beneficiary age, gender, race, dual eligibility status, and disability status at the time of the program enrollment. We also include covariates for comorbidities, using HCC score from the CMS HCC Model for all diagnoses one year prior to start of a specific program quarter[69]).

[69] CMS HCC Model, 2013. Available at: http://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors-Items/Risk2013.html?DLPage=1&DLSort=0&DLSortDir=descending.

Appendix D: Primary Data Collection and Analysis

Overview

This appendix offers an update on primary data collection and analyses through August 1, 2015, and details on qualitative data collection and analysis methods. Refer to the methods update chapter for an overview and to individual awardee chapters for observations based on primary sources and data.

Site Visits

During the spring of 2015 NORC conducted a second site visit to eight of our 23 awardees, as described in the methods chapter of this report. Budget and staffing constraints did not allow for a second site visit to all awardees. The decision to make a second visit was based on an assessment of data gaps and the ranking of priorities for addressing these gaps, according to a set of criteria developed in consultation with CMMI. Exhibit D.1 summarizes our ranking and selection criteria. Awardees highlighted in gray and ranked as first priority received a second site visit between February and May of 2015.

For awardees that did not receive a second site visit, NORC conducted a telephone interview to learn about programmatic changes and progress since the initial site visit and discuss the awardee's plans for continuing their work following the end of HCIA funding. See Exhibit D.2 for the template for the interview protocol.

Exhibit D.1: Ranking of Awardees for Second Site Visit Planning

	Awardee	Size of CMS award ($$, in millions)	# enrollees to date (as of September 31, 2014)	Proposed Criteria (ranked from more to less important)						Decision	
				Challenge to Evaluability (lack of claims data)	Complexity of Intervention, including # sites	Major change in scope or other	Delayed Implementation (6 months+)	Active plans to sustain beyond HCIA	Demonstrated success on outcomes	1st priority	2nd priority
Post-Acute Care	BIDMC	$4.9	1,464					■			
	J-CHiP	$19.9	44,714		■		■	■		■	
	PRHI	$10.4	2,405		■		■	■			■
	PPMC	$17.3	6,722		■			■		■	
	St. Francis	$5.3	609	■							
	U Iowa	$7.7	896		■						■
	UT Houston	$3.7	172								
	VUMC	$2.4	1,007					■	■		
LTSS	CLTCEC	$11.8	1,264		■	■	■			■	
	CKRI	$1.8	99			■					
	DDHS	$3.7	251	■ (for New Jersey)							
	JHU SON	$4.1	145								
	Northland	$2.7	342	■				■		■	
	SCRF	$2.9	322	■							■
	UAMS	$3.6	1,842	■							■
	URI	$14.0	236	■		■	■			■	
Specialized	LifeLong	$1.1	168								
	CCNC	$9.3	8,069	■	■	■				■	
	PCCSB	$4.2	750								
	Sutter Health	$13.0	4,233		■			■	■	■	
	UEMS	$2.6	927								
	U New Mexico	$8.5	214				■	■			■
	U North Texas	$7.3	4,421	■	■		■	■		■	

Exhibit D.2: Telephone Protocol Template, Awardee Interview

Overview

- Introductory remarks, noting progress with NORC evaluation and anticipated timeframe for reporting qualitative, survey, and quantitative findings.
- Purpose of this call, to hear about progress more generally since site visit, to clarify some key points that we explore in the evaluation, and to check facts.

Update on the Intervention

- What significant or unexpected changes have there been since NORC's site visit in 2014?

Feedback on NORC's Q5 report

- Cross-awardee chapter
  - Has NORC accurately described the program model for your intervention?
- Awardee chapter
  - Are there updates or changes in how your intervention is staffed or trains its staff?
  - Are you participating in a workforce demonstration other than HCIA 1 (federal or other)?

Implementation Experience

- What has been most helpful in supporting implementation?
- What has been most challenging to implementation?
- Dosage: How do you define dosage for your intervention? What is the minimum effective dose? A fully effective dose? How does dosage compare with a usual source of care, if this comparison may be made? How do variations in dosage affect outcomes?
- Reach: How do you describe the reach of your intervention?
- Recruitment and enrollment time periods: what was the date or dates for starting participant recruitment? For enrolling participants, if different from recruiting them? For closing out recruitment and enrollment?
- Average or typical time enrolled: What is the average length of time that a participant is enrolled? Is there a cut-off time after which patients no longer receive services?
- How has the intervention leveraged existing resources supported by Medicare, for example, health IT? Conversely, are there secondary uses for health IT developed by the intervention? Are other Medicare-supported projects able to leverage resources created or provided by the intervention?

Contextual Factors

- To what extent have policy, political environment, or regulatory considerations supported or conflicted with implementation?
- How have changes in the local or regional health care marketplace affected your intervention? What changes do you anticipate in the next year to two years?
- Are you or your intervention partner(s) participating in another payer demonstration (in addition to HCIA) or an ACO? For example, a hospital readmissions initiative.

- Are you or your intervention partner(s) participating in a health IT demonstration (federal or other)?

Program Effectiveness

- Spillover effects. (Define this term for awardee, as indirect or unintended effects of the intervention, either processes or outcomes). Are there spillover effects at intervention sites? For patients or enrollees and their families? For partner providers? For stakeholders? For the local population?
- Walk through quantitative findings presented in NORC's Q5 report. What explanations can the awardee offer for the trends seen in the time-series and/or difference-in-differences analyses of utilization, cost, and supplemental measures?

Plans to Sustain and/or Scale the Intervention

- Overall summary of plans for the immediate future? Long term?
- Ask the awardee to walk us through the key issues mentioned in their Q10 self-report, related to future plans. In Section 4C of their Lewin report (IV. Operational Plan, C. Sustainability and Spread), the awardee gives a short explanation about sustainability planning (Exhibit 15A), a description of scale and spread (Exhibit 15B), and a review of the major barriers to implementation and operation as well as the three most important lessons learned (Exhibit 15C).

Closing

- Are there other thoughts or observations you would like to share with us today?
- Thank you for your time. Your participation in this interview is very much appreciated.

Standard Site Visit Protocol. Initial plans for a site visit, including interviews, observations, and focus groups or group discussions at one or more sites for each awardee, are finalized through a series of at least two planning calls with each awardee. During site visit planning calls, NORC and the awardee together identify:

- timing for the visit,
- topics for exploration as part of the site visit,
- NORC staffing (e.g., number of staff, subject area expertise),
- prospective interview subjects (either individuals or groups, for example, a leadership team),
- timeframe for interviews (e.g., whether during the site visit or at another time as respondents are available),
- criteria for selecting sites to visit where an intervention has multiple sites and site selection itself,
- feasibility of focus groups or group discussions for consumers, informal family caregivers, and/or workforce trainees and the logistics of convening these groups (e.g., transportation, interpreters, consents, compensation for participants), and
- opportunities to observe or participate in intervention activities (e.g., case conferences, training, one-on-one meetings with patients).

A site visit itinerary is generated on the basis of the planning calls and revised in collaboration with the awardee over a period of weeks leading up to the site visit. As the itinerary is developed, NORC staff creates focus group/group discussion screening guides (sent to the awardee for their use in recruiting group participants) and discussion guides, and a set of protocols to guide the semi-structured interviews planned for each site visit.

Qualitative Data Procedures. Following a site visit, the NORC cohort team cleans and codes qualitative data. Each site visit team prepares a final set of notes, supplemented with recordings made during interviews and focus groups with team members triangulating their own sets of notes to improve validity. Analysis begins immediately after a site visit when the team prepares an informal debriefing memorandum for internal use and presents the memo at a weekly qualitative analysis meeting to facilitate shared learning across the three cohorts. The site debriefing memoranda are used to create a preliminary table of observations that enables comparisons across awardees and the organization of observations into categories related to the research questions that NORC will answer in the evaluation. The site visit debriefing memoranda and the preliminary table of observations are used, together with notes from telephone interviews, site visit notes, and program documents, to inform the development of theme-based analyses for the quarterly reports and to guide development of theme-based coded analyses, as described below.

Coding of Qualitative Data

Coding of site visit and telephone interview notes was completed in three waves—one for the site visits made between March and June 2014 (coded between September and November 2014), a second for site visits made between July and October 2014 (coded in December 2014), and a third for second round site visits and telephone interviews conducted between February and May 2015 (coded in June and July 2015).). Formal analysis of these coded data took place after the second and third waves of coding exploring data from the first round of site visits and all of the site visit/telephone interview data collected to date, respectively. For this report, all data (regardless of coding wave) related to program drivers and implementation effectiveness were examined.

One or more members of each NORC site visit or cohort team participate in coding once they have finalized notes and prepared debriefing memoranda that enable interim analyses for reporting purposes. Tapping site visit or cohort team members for coding is a best practice that improves coding quality by maximizing the coder's background knowledge about the awardee. In addition, a coder's familiarity with multiple awardees improves their capacity to propose refinements to the codebook that capture meaningful developments while retaining a parsimonious approach to coding. We have completed coding of the qualitative data from the full set of initial and second round site visits and have begun formal analysis of themes and categories of themes with this report.

Codebook development began with senior team members generating an initial set of binary codes (creating a pair of positive and negative values for each code) through a round of open coding on NORC's set of interviews with CMMI project officers. This initial list of codes and code families was cross-walked with a pared-down version of the conceptual model created by the meta-evaluator.

The team took a parsimonious approach to code creation, using a small number of codes derived from the four code families and including an "other" code for each family as a location in which to gather themes that may later be relabeled as a new code; following best practices in coding, the target number of codes is intended to be fewer than 50. See Exhibit D.3 for a depiction of the evaluation's code families.

An internal team of coders was trained on the initial code book. Using the initial round of awardee interviews, coders went through six rounds of coding, to test and further specify the codebook. Through this iterative process, new pairs of binary codes and criteria for inclusion and exclusion were added and existing codes were further refined. The practice not only helped improve the codebook itself but also built inter-rater reliability toward 80 percent or greater. Refinement of the codebook will continue over the life of the evaluation, using the same iterative process of code generation and team consultation as coding proceeds for site visit and related interview documents.

Once site visit notes were ready for coding, each team member was assigned a subset of the 23 awardees, and asked to code all materials related to that awardee's site visit thus improving the quality of coding by facilitating the growth of in-depth expertise about the awardees for whom s/he codes data. All coding was done in qualitative data analytic software QSR NVivo v10. After all four coders had coded one complete site visit, they met to discuss their coding experience and recommended changes to the codebook. To ensure consistency, coders expressed the desire to do a preliminary inter-rater reliability (IRR) check. Based on this request, one transcript from each site was randomly selected (10 percent sample) and given to another coder to recode. A high level of agreement (95.6 percent) reassured coders that they were coding reliably based on the codebook and their training. While coding continued, a stratified random sample (such that one site was a stratum) was drawn from the remaining sites that had not been reliability checked. To draw the sample, transcripts were numbered 1-X per site and a random number generator (http://www.random.org/) was used to pick numbers. Sample size was 10 percent of all transcripts coded in the first wave of coding or 1 transcript per site (n= 4 in the first round of IRR and n=13 in the second round of IRR, or 17 total for this wave of coding). All randomly selected transcripts were sent to a second coder (who did not serve as a primary coder) with the segments highlighted and codes removed. All of the segments identified by the first coder were then recoded by the second coder. IRR was calculated using the Coding Compare query tool in NVivo as the percent agreement between the first and second coder on coded segments only. The overall agreement between first and second coder was 93.6 percent, which is considered excellent.

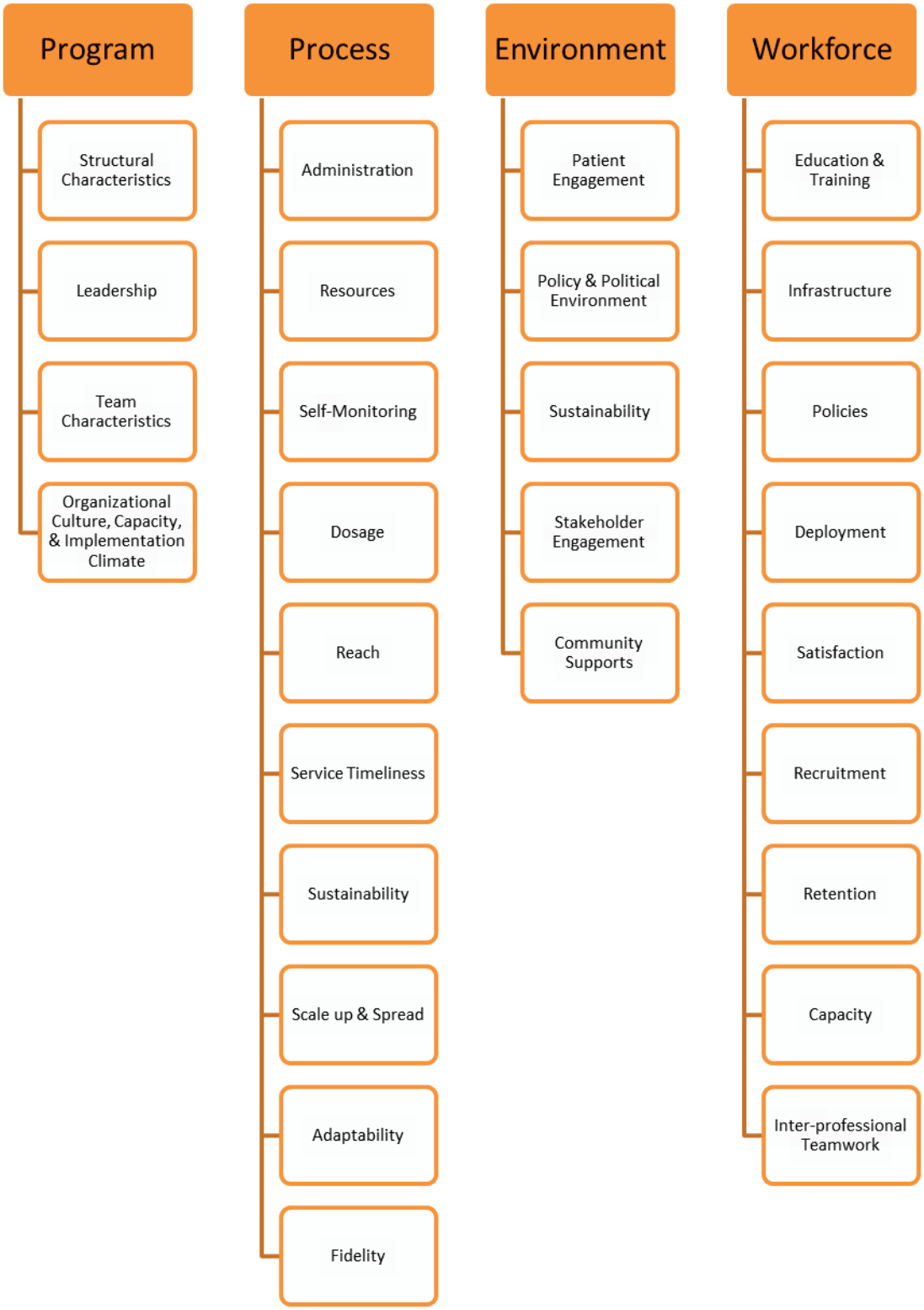
Data Analysis and Interpretation

As described in earlier NORC reports, analysis and interpretation rely on a mixed methods approach. For qualitative data, content analysis is being used to develop themes within, between, and across the 23 awardees, each of which comprises a case study. Initial analyses were conducted to explore themes by coding family. After all data were coded in July 2015, cohort team members ran queries for their awardees and discussed thematic findings in a series of three weekly qualitative team meetings with other cohort teams. Prior to each meeting, all cohorts entered quotes resulting from their queries into a single excel spreadsheet, with each tab focusing on one specific code and reflected on potential code-based and family-based themes for their group of awardees. Each meeting centered on a different coding family—process, program, and environment—and allowed for presentation of cohort-based themes and cross-

cohort theme generation. After each meeting, one member of the coding team reviewed the cohort query spreadsheet and assigned consistent themes across the identified quotes. New tables organized around themes (as opposed to codes) were then created to help better understand cross-awardee themes and sub-themes as well as relevant examples. These theme tables were used to guide the writing of the cross-awardee chapters in the annual report. Key words searches have also been conducted to supplement the theme tables.

Themes generated from the qualitative data will be considered in light of quantitative findings and used to interpret quantitative results. Qualitative findings will eventually be used to refine and create independent variables for quantitative analyses and to test new hypotheses generated by the quantitative results: to explicate what aspects of a particular intervention work for which populations, how, and under what circumstances (realistic evaluation). Both qualitative and quantitative analyses will be synthesized to answer the core research questions and to address the issue of scalability for all awardees.

Exhibit D.3: Code Families



Surveys

The specific approach to survey data collection varies by awardee. In some cases, we are designing and administering our own survey; for other awardees NORC is collaborating in the design and fielding of an awardee's own survey; and for the remaining awardees, NORC will ask to receive raw survey data rather than contributing to the design or fielding a survey directly. Exhibit D.4 lists the survey domains. For sites where a small number of staff has been trained (making survey methods unreliable), we use qualitative methods (interviews, focus groups or group discussions, semi-structured worksite observations) to collect data on training experiences, using the same set of domains as the survey, with the understanding that the comparability of narrative with survey responses is limited**.**

Exhibit D.4: Domains for NORC Surveys

Consumer/Caregiver Experience Survey
▪ Access to health care & human services ▪ Participation & experience with care coordination ▪ Medication management ▪ Relationship with providers, community health workers/navigators/peer educators, & direct (personal) care aides ▪ Patient autonomy, self-determination, intervention support for patient goals ▪ Patient and caregiver satisfaction & confidence in care system ▪ Experience of informal (unpaid family) caregiver with intervention ▪ Patient & caregiver activation ▪ Health status (general, specific conditions addressed by an intervention) ▪ Functional status (mobility, self-care, usual activities, pain, anxiety & depression, fragility, cognitive status, communication-related impairments, quality of life)
Workforce Trainee Survey
▪ Worker satisfaction ▪ Changes in beliefs & attitudes ▪ Changes in knowledge & skills ▪ Changes in behavior ▪ Interprofessional teamwork ▪ Intervention-specific competencies (e.g., use of electronic health records, motivational interviewing) ▪ Training experience ▪ Systematic (environmental) factors

This section provides an overview of our survey development process and a table summarizing survey activity decisions for the 23 awardees.

Our survey development protocol included a period of initial review of awardee surveys, one or more calls with the awardee to determine the scope of NORC tasks, namely, whether to coordinate with ongoing awardee survey work or field a stand-alone survey. Exhibit D.5 gives a summary of the status of NORC's stand-alone consumer and workforce surveys. Further details about survey status are available in the awardee-specific chapters.

Survey Data Cleaning and Analysis Summary. For the two awardee surveys analyzed to date and described in this report (Courage Kenny, UAMS), quality assurance and quality control checks were completed on each data set. These checks were applied to identify missing, invalid, inconsistent or otherwise potentially inaccurate records. Cleaning was performed in SPSS for Courage Kenny and SAS for UAMS. For example, univariate analysis of key variables was used to examine the frequency distribution of responses and identify outliers in numerical values. Records were tracked through the logical flow of data to ensure

that conditional skip logic was reflected in the data as expected, and review of open-ended responses was completed to identify themes and commonalities. Qualitative data from Courage Kenny respondents was provided in extraneous comments, in addition to open-ended questions, and these extraneous comments were integrated into the final analytic data set. Once each data set was cleaned and reviewed, basic frequencies and means were generated from the cleaned data sets and used in the analyses for this report.

Exhibit D.5: Status, NORC Stand-Alone Consumer and Workforce Surveys

Awardee	Consumer or Workforce	Current Status			Next Step (estimated timing)		
		Finalize Survey	Collect Data	Analyze Data	Administer Survey	End Data Collection	Analyze Data
LifeLong	Consumer			■			Sept-Nov 2015
PCCSB	Consumer		■			Mid-Sept 2015	
UAMS	Consumer			■			Sept-Nov 2015
PPMC	Workforce		■		May-June 2015	June 2015	July-Oct 2015
PRHI	Workforce		■		May-June 2015	June 2015	July-Oct 2015
SCRF	Workforce			■			Sept-Nov 2015
SCRF	Consumer			■			Sept-Nov 2015
Sutter Health	Workforce		■		May-June 2015	June 2015	July-Oct 2015
CCNC	Workforce		■		May-June 2015	June 2015	July-Oct 2015
Northland	Consumer			■			Sept-Nov 2015
Courage Kenny	Consumer			Mar-Apr 2015			■

Appendix E: Cross-Awardee Tables

Exhibit E.1: Awardees by Target Population (From NORC First Annual Report)

Awardee	Frail Elders or Those with Multiple Chronic Conditions	Adults (18 years+) with Physical Disabilities or Those with Multiple Chronic Conditions	Adults (18 years+) living with Behavioral Problems, Mental Illness, or Cognitive Impairment	Adults with Late-Stage Disease	Adults living with Intellectual & Developmental Disabilities	Children with Complex Health Conditions
BIDMC	■					
CLTCEC	■	■				
CCNC						■
CKRI		■	■		■	
DDHS			■		■	
J-CHiP	■	■	■	■		
JHU SON	■					
LifeLong	■	■	■		■	
Northland	■					
PCCSB	■	■		■		
PRHI	■			■		
PPMC	■	■	■			
SCRF	■	■				
St Francis	■	■				
Sutter Health	■	■		■		
UEMS	■	■				
UAMS	■					
U Iowa	■	■	■			
U New Mexico	■	■	■			
U North Texas	■		■	■	■	
URI			■		■	
UT Houston						■
VUMC	■			■		
Totals	**18**	**12**	**9**	**5**	**3**	**2**

Exhibit E.2: Program Models, Comprehensive Care for Persons Living with Multiple Chronic Conditions

Categories of Models that Integrate Health Care with Community-Based Services and Supports
■ **Caregiver Education and Support**. Typically led by psychologists, social workers, or rehabilitation therapists, these programs provide some combination of health information, training, access to clinical and community resources, emotional support, counseling, and information about coping strategies. ■ **Transitional Care**. In order to make patient transitions from a hospital to another site of care smoother and safer, services are typically provided by a nurse or advance practice nurse, who begins by preparing the hospitalized patient and informal caregiver for discharge. The nurse or "transition coach" may participate in the discharge planning, teach the patient about self-care (particularly about the use of medication), coach the patient and informal caregiver about communicating with health professionals effectively, visit the patient soon after discharge, and monitor the patient for days to weeks after the transition. Transitional care plans may include community-based resources, such as home health care, meals on wheels, or subsidized handicapped transportation. ■ **Chronic Disease Self-Management**. Self-management interventions are structured and time-limited, and designed to provide health information and empower patients to assume an active role in managing their chronic conditions. When led by health professionals, these interventions may focus on managing a specific condition, such as stroke; others, often led by trained lay persons, are aimed at addressing chronic conditions more generally. ■ **Outpatient Comprehensive Geriatric Assessment, Geriatric Evaluation and Management (GEM).** GEM services are usually staffed by interdisciplinary teams of physicians, nurses, social workers, and may also use rehabilitation therapists, pharmacists, dieticians, psychologists, or clergy. These supplementary services help with identifying the patient's health conditions, developing a treatment plans for those conditions, and implementing the treatment plans over weeks to months. GEM programs communicate with their patients' established primary care providers, exchanging information and making recommendations about care. Community-based supportive services may be included in their plans and recommendations. ■ **Complex Clinics**. Complex clinics provide comprehensive care for people with complicated medical and psychosocial conditions in multidisciplinary primary care practices. ■ **Interdisciplinary Primary Care**. Teams composed of a primary care physician and one or more other co-located health care professionals: nurses, social workers, nurse practitioners, or rehabilitation therapists, provide comprehensive care. High-risk patients receive comprehensive health assessment, comprehensive care planning, proactive monitoring, transitional care, coordination of health and community services, and support for family caregivers. PACE and the Patient-Centered Medical Home (PCMH) offer interdisciplinary primary care. ■ **Care/Case Coordination.** A nurse or a social worker serves as a care manager to help chronically ill patients and their families assess problems, communicate with health care providers, and navigate the health care system in order to improve efficiency in use of services. ■ **Collaborative Medical Homes.** Primary care practices collaborate with community-based agencies to provide the services of a comprehensive medical home to their patients. Partner agencies typically include centers for independent living, area agencies on aging, and county health or human services departments. ■ **Comprehensive Inpatient Care.** These may have a focus on geriatric assessment or consultation or pharmacy. Objectives include "preventing adverse events, facilitating transitions back to the community, and reducing readmissions to the hospital."
Categories of Models That Usually Do Not Integrate Community-Based Services and Supports
■ **Preventive Home Visits.** Nurses, physicians, or other staff perform multidimensional assessments of older people in their home and make recommendations to primary care providers. Some programs incorporate community-based supportive services with medical services; others are entirely medical in focus." ■ **Pharmaceutical Care.** Pharmacists provide advice about medications to patients or interdisciplinary care teams in a variety of settings; their recommendations may pertain to a particular site of care (e.g., nursing home, patient's home), a specific disease (e.g., heart failure, hypertension), or target patients with specific profiles, such a polypharmacy.

Categories of Models That Usually Do Not Integrate Community-Based Services and Supports (Continued)

- **Care in Nursing Homes.** Typically primary care delivered by an advance practice nurse or physician assistant who "evaluates the resident every few weeks, trains the nursing home staff to recognize and respond to early signs of deterioration, assesses changes in the resident's status, communicates with the resident's family, and treats straightforward medical conditions at the nursing home (rather than admitting the resident to a hospital)." Staff may include a consulting physician.
- **Disease Management.** Services by nurses or other trained personnel that supplement primary care by providing patients with support and information about their chronic conditions, either in writing or by telephone. Health insurers or capitated provider organizations may contract with disease management companies to provide patients with health education and instructions for self-monitoring, treatment guidelines, and communicating with their providers.
- **Prevention and Management of Delirium.** Care for "hospitalized older patients…usually involve training hospital staff, implementing preventive measures and routine screening for delirium, using evidence-based guidelines to address risk factors for delirium, assessing its causes, and treating it promptly when it appears."
- **Proactive Rehabilitation.** Supplementary to primary care, rehabilitation therapists provide outpatient assessments and interventions designed to help physically disabled older persons improve their functional autonomy, quality of life, and safety within the home.

Source: Boult C, Murphy EK. "New Models of Comprehensive Health Care for People with Chronic Conditions," Appendix B, pp. 285-317 in Institute of Medicine, Living Well with Chronic Illness: A Call for Public Health Action (Washington, DC: National Academy of Science, 2015).

Exhibit E.3: Categories of Program Models Adapted by Awardees

Model	# of Awardees (23 total)	# Pediatric (2 total)	# Rural (6 total)	# Behavioral (8 total)	Awardees
Models that integrate medical and community-based care					
Caregiver Education and Support	10	2	3	1	CLTCEC, CCNC, DDHS, Northland, PCCSB, SCRF, Sutter Health, UAMS, U North Texas, UT Houston
Transitional Care	9	0	2	3	BIDMC, J-CHiP, PPMC, PRHI, St Francis, Sutter Health, U Iowa, U North Texas, VUMC
Chronic Disease Self-Management	8	0	1	2	CKRI, J-CHiP, Northland, PRHI, St Francis, Sutter Health, UEMS, U North Texas
Outpatient Comprehensive Geriatric Assessment, Geriatric Evaluation and Management	6	0	2	0	JHU SON, Northland, PCCSB, SCRF, Sutter Health, U North Texas
Complex Clinics*	5	2	1	3	CCNC, CKRI, DDHS, U New Mexico, UT Houston
Interdisciplinary Primary Care	5	0	2	4	J-CHiP, Northland, LifeLong, PPMC, U New Mexico
Care/Case Coordination	4	0	0	2	JHU SON, J-CHiP, PPMC, UEMS
Collaborative Medical Homes*	4	1	1	3	CCNC, CKRI, LifeLong, Northland, URI
Other Models					
Preventive Home Visits	10	0	2	4	CKRI, DDHS, JHU SON, LifeLong, Northland, PCCSB, PRHI, SCRF, Sutter Health, U New Mexico
Pharmaceutical Care	5	0	0	2	BIDMC, J-CHiP, PPMC, PRHI, VUMC
Care in Nursing Homes	3	0	0	1	J-CHiP, U North Texas, VUMC
Comprehensive Inpatient Care	1	0	0	1	J-CHiP
Disease Management	1	0	0	0	PRHI
Prevention and Management of Delirium	1	0	0	0	J-CHiP
Proactive Rehabilitation	1	0	0	0	JHU SON

NOTE: Categories of models from IOM, 2015. * According to IOM (2015), models not yet demonstrated in the peer-reviewed literature to improve quality of life or functional autonomy for persons living with chronic illness.

Exhibit E.4: Key Intervention Components, by Awardee

Awardee	Coordinate and/or Deliver Care				Redesign Clinical Workflow or Process	Develop Dedicated Technology		Engage Participants and/or Caregivers		Develop Workforce	
	Care Coordi-nation	Care Manage-ment	Medical Home	Home Care		Health IT	Teleme-dicine	Patient Navigation	Patient Decision Support, Shared Decision Making	Provider Decision Support, Clinical Practice Guidelines	Training Non-licensed Caregivers or Personal Care Aides
BIDMC	■				■	■		■	■		
CLTCEC				■					■		■
CCNC	■					■		■		■	
CKRI	■		■		■		■	■	■		
DDHS	■		■		■						
J-CHiP	■		■		■	■		■	■	■	
JHU SON	■			■				■	■		
LifeLong	■		■					■	■	■	
Northland	■	■		■		■	■	■	■		
PCCSB	■			■		■		■	■	■	
PRHI	■		■	■	■	■		■	■		
PPMC	■	■	■		■	■		■	■	■	
SCRF	■			■				■	■		■
St Francis	■			■		■	■		■		
Sutter Health	■	■		■	■	■		■	■	■	
UEMS	■					■		■	■		
UAMS Schmieding Center											■
U Iowa	■		■	■	■	■	■	■	■	■	
U New Mexico	■		■	■	■	■		■	■	■	
U North Texas	■			■	■	■			■	■	■
URI	■		■		■		■	■	■		
UT Houston	■	■	■	■	■			■	■	■	
VUMC	■				■	■				■	■
Totals	**21**	**4**	**10**	**12**	**13**	**14**	**5**	**17**	**19**	**11**	**5**

Exhibit E.5: Intervention Setting, by Awardee

Awardee	Intervention Setting(s)			
	Hospital Inpatient/ Observation	Ambulatory Care (hospital ED, hospital outpatient, FQHC, PCP)	Skilled Nursing	Community and Home (includes assisted living)
BIDMC	■	■		
CLTCEC*				■
CCNC	■	■		
CKRI		■		■
DDHS		■		
J-CHiP	■	■	■	■
JHU SON				■
LifeLong		■		
Northland		■		■
PCCSB				■
PRHI	■	■		
PPMC	■	■		■
SCRF				■
St. Francis	■			■
Sutter Health	■	■		■
UEMS		■		■
UAMS*				■
U Iowa	■			■
U New Mexico		■		■
U North Texas	■		■	■
URI		■		■
UT Houston	■	■		
VUMC	■		■	
Totals	**11**	**14**	**3**	**16**

NOTES: *Intervention consists of training for personal care aides.

Exhibit E.6: Geographic Spread of Awardees

Number of Sites	Awardee	Population Density*	Geographic Spread/Range	Notes
One site, one organization				
	CKRI	urban	Metro Minneapolis-St Paul	
	JHU SON	urban	Baltimore	
	PCCSB	urban	Metro Santa Barbara	
	UEMS	urban	Metro Buffalo	
	UT Houston	urban	Metro Houston	
Multiple sites within 1 health care organization or system				
1	J-CHiP (health care system)	urban	Metro Baltimore	Different parts of model at different sites
1	PPMC (Continuing Care Organization)	urban	3 county Portland area	
2	St Francis (foundation)	urban, suburban, rural	Hawaii (Oahu, Hilo)	
3	LifeLong (health care system)	urban	City of Berkeley	
67	U North Texas (Brookdale Senior Living; corporation)	urban	5 states (CO, FL, TN, TX, KS)	Different arms, most in multiple states**
Multiple sites, awardee partnership(s) at each site				
2	URI	urban	2 towns in RI	
4	SCRF	urban, rural	4 counties in SC	
6	BIDMC	urban, suburban	Metro Boston	
6	DDHS	urban, suburban	New Jersey, New York	
6	Northland	urban, rural	North Dakota	
6	PRHI	suburban, rural	Western PA and WV	
10	U Iowa	rural	Iowa (9 counties)	
10	U New Mexico	urban, suburban, rural	New Mexico	Central program office, decentralized oversight
11	CCNC	suburban; rural	North Carolina	Central program office, decentralized oversight by each site
13	Sutter Health	urban, suburban, rural	Central and northern CA	Partnerships vary by site, central program office oversight
23	VUMC	urban, suburban, rural	2 states (TN, KY)	
Personal care aide training program				
3	CLTCEC	urban, suburban	3 counties in CA (LA, Contra Costa, San Bernardino)	
4	UAMS	urban, suburban, rural	4 states (AR, CA, TX, HI)	

Exhibit E.7: Inter-Professional Team Construct and Characteristics, by Awardee

Awardee	Team Construct? (teamwork, team-based care)*	Leader	Team includes clinical and non-licensed staff?	Same Location/ Time or Asynchronous
BIDMC	Teamwork	RN	no	Varies
CLTCEC**	Teamwork	Patient	no	Same location (home based)
CCNC	Teamwork	RN	yes	Same location (hospital based)
CKRI	Team-based care	RN	yes	Different (home & clinic)
DDHS		NP	no	
J-CHiP	Team-based care	Varies	yes	Varies
JHU SON		RN & OT		
LifeLong	Team-based care	RN and Peer Coach	yes	Same location (clinic based)
Northland				
PCCSB	Team-based care	RN	no	Different (home visits)
PRHI	Team-based care	RN	no	Same location
PPMC	Team-based care	Varies		
SCRF	Team-based care	RN	yes	Same location (home based)
St Francis	teamwork	RN		Different (home & clinic)
Sutter Health	Team-based care	RN	no	Different locations (hospital, home, & remotely)
UEMS	Team-based care	CHW	yes	Different locations (hospital & home)
UAMS**	Teamwork	Patient	no	Same location (home based)
U Iowa	Team-based care	RN	no	Different locations
U New Mexico	Team-based care	MD, NP, or PA	yes	Different locations (clinic, home & remotely)
U North Texas	Teamwork	RN	yes	Same location (BSL residence/community)
URI	Team-based care	RN	yes	Same location (clinic)
UT Houston	Team-based care	NP, MD		
VUMC	Teamwork	RN	yes	Different times and locations

NOTES: *Teamwork is defined as cooperation among different health professionals; team-based care is defined as “care delivered by intentionally created, usually relatively small work groups in health care, who are recognized by others as well as by themselves as having a collective identity and shared responsibility for a patient or group of patients.” Definitions from AHRQ, TeamSTEPPS National Implementation. Team STEPPS curriculum tools and materials, cited in Interprofessional Education Collaborative Expert Panel. 2011. Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel. Washington, DC: Interprofessional Education Collaborative. ** The HCIA-funded intervention is for training that supports interprofessional teamwork, as summarized in the table, rather for delivery of care or coordination of care using an interprofessional approach.

Exhibit E.8: Training Models, by Awardee

Awardee	Written Curriculum			Experiential		Competency Testing?
	Class-based didactic instruction	Online instruction	Role play, train the trainer, discussion	Case Conference, Rounding, Learning Collaboratives, Clinical Guidelines	Shadowing/ Mentoring	
BIDMC	■				■	
CLTCEC	■		■			■
CCNC	■	■			■	
CKRI				■	■	
DDHS					■	
J-CHiP	■		■	■	■	■
JHU SON				■	■	
LifeLong	■			■	■	
Northland	■			■	■	
PCCSB				■	■	
PRHI	■			■		■
PPMC	■		■	■	■	■
SCRF	■		■	■	■	■
St. Francis	■	■			■	
Sutter Health	■	■	■	■	■	■
UEMS	■		■	■	■	■
UAMS	■	■	■			■
U Iowa	■	■	■			
U New Mexico	■	■	■	■	■	■
U North Texas	■			■	■	■
URI						
UT Houston				■	■	
VUMC	■	■	■	■	■	■
Totals	17	7	10	15	18	11

Exhibit E.9: Awardee Plans for Sustaining Interventions

Awardee	No-Cost Extension (NCE), Number of Months		Sustainability	
	Partial	Full	Elements	Funding
BIDMC	N/A		All 6 clinic sites to continue	Awardee and sites to support
CLTCEC		7	IHSS provider-client courses in 7 counties, with new content added specific to California	Pending renewal of Medicaid 1115 waiver, with CLTCEC intervention integrated into state's CCI program
CCNC	N/A		Each organizational site will decide whether and how to sustain intervention	■ Sites' provider networks and health care systems to fund in short term ■ In next 2-5 years, CHACC leadership proposed Innovation Center and Clinically Integrated Network (CIN) for pediatrics in the state, supported by Medicaid program. Legislation pending on whether Medicaid will enable proposed CIN (provider-led) or managed care
CKRI		12	RN care coordination and in-home support services (Independent Living Skills), telehealth (may modify form) and Chronic Disease Self-Management Program, through 2015	■ Medicare, Medicaid, and commercial insurance, as well as Courage Kenny Foundation support. Requesting per member per month care coordination payments from commercial payers who cover both Medicaid managed care and commercial populations to underwrite innovation until transition from FFS to risk-based contracts. Currently participating in the state's Integrated Health Partnership (IHP) Medicaid shared savings demonstration as part of Minnesota's State Innovation Model reform
DDHS	6		DD Health Home to be integrated into service sites at Albert Einstein Medical Center and Montefiore Medical Center	Site to support
JHUSON		6	Under NCE, full intervention	Beyond NCE period, pending application to be part of Medicaid waiver.
J-CHiP	12		■ Under NCE, community arm to be sustained. The clinic-based services will be funded for 7-8 months and Tumaini for Health (community outreach services) for 9 months ■ For PAC arm, expect to sustain aspects of the intervention, including multidisciplinary rounding, team collaboration with behavioral specialists and pharmacy extenders, patient education, and collaboration with the 5 partner SNFs.	Pending outcome of FY2016 budget requests for Johns Hopkins Hospital, Bayview Medical Center, also possible funding under state's all-payer global payment arrangements (Health Service Cost Review Commission)
LifeLong		6	Modified program model to staff using full-time or on-call peer counselor, to lower cost; continue CIL partnership for classes	■ Alameda Alliance for Health (Medicaid health plan) to support care coordination. ■ May integrate into another HCIA-funded pilot with Pacific Business Group on Health

Awardee	No-Cost Extension (NCE), Number of Months		Sustainability	
	Partial	Full	Elements	Funding
Northland		12	Under NCE, plan to sustain full intervention	Northland is approved to be a Medicaid provider, for small proportion of participants who are Medicaid only (not dually eligible or covered under ACA expansion)
PCCSB		12	Modified program model to staff with NPs and MDs making initial home visit for triage	■ Tested sliding scale (tiered) fee for consumers, also funded by senior housing; covers part of cost ■ May provide care management for dually eligible participants under contract to local Medi-Cal (Medicaid) provider, as transition of care. Local ACO not yet in position to contract with PCCSB
PRHI		8	Under NCE, five remaining sites will sustain; expect that two of five will sustain post-NCE and three others will integrate intervention into ongoing quality improvement efforts	Sites (hospitals) to support
PPMC	N/A		Close alignment between the intervention and state Medicaid reform enables sustaining most arms, including ■ CTrain (at Oregon Health and Sciences University and Legacy Health System sites) ■ ITT (in Clackamas, Washington and Multnomah counties) ■ Health Resilience Program (at Providence Portland and CareOregon) ■ Central City Concern Health Improvement Project (CoreOregon) ■ Skin Care Clinic (Central City Concern)	State Medicaid program's CCO and constituent organizations
SCRF	N/A		Training for personal care aides (Home Care Specialists) will be offered online, as 12 modules, with certification of completion	Awardee to support
St Francis		12	Under NCE, plan to sustain, although Hilo arm stopped enrolling in June 2015 St Francis home health to sustain telemonitoring component	Possible future partnership with HMSA (Hawaii's largest health plan), as well as other health plans and hospitals
Sutter Health	N/A		All 13 sites	Awardee to support
UEMS		12	Modified version will be sustained at original site and expand to 7-9 additional EDs in the region. The project will retain initial focus on ED recruitment but EDs will be able to use CHWs, patient navigators or care coordinators to perform these functions. At ECMC, role of CHWs will be changed to that of patient navigation	■ Site host (Erie County Medical Center) includes intervention under DSRIP (Millennium Collaborative Care), part of New York's 1115 Medicaid waiver program ■ Expect support from ECMC to subsidize primary care provider participation
UAMS	12*		Schmieding Center will continue to offer courses developed with HCIA funds in Arkansas, Texas and California. NCE will be utilized for the sole purpose of microloan collections and reporting	■ Awardee ■ No microloan. Possible future partnership with lender to offer. CMMI clarified that funds used for microloans must be returned to CMS

Awardee	No-Cost Extension (NCE), Number of Months		Sustainability	
	Partial	Full	Elements	Funding
U Iowa	N/A		At least five of the 10 partner Critical Access Hospitals plan to sustain	Sites (CAHs) to support
U New Mexico		12	Under NCE, full intervention	Medicaid MCOs cover Outpatient Intensivist Teams. MCOs exploring possible shared savings model with clinical sites
U North Texas	N/A		Full intervention at all Brookdale Senior Living sites (SNF, AL/MC, HH, IL) and relationships in selected markets with high-referral hospitals	Awardee to support
URI	N/A		Both sites provide case management for high-risk participants including those with I/DD. There is a possibility that ambulatory care clinics equipped as part of intervention will provide integrated care at a future time	Contracts with Rhode Island's Medicaid managed care vendor (Neighborhood Health Plan)
UT Houston		12	Under NCE, full intervention	■ Through Feb 2016, support from federally matched funds provided by Texas Network Access Improvement Program ■ Negotiating funding via arrangement with Texas HHS and Amerigroup (Medicaid MCO)
VUMC	N/A		Awardee's Transitions Management Office plans to sustain a modified version of intervention using a new "transfer wizard" discharge platform (VUMC EHR), including part of the medication management form and PAC Transfer tool (built on Nursing Transition Summary (NuTS) form)	Awardee and partner SNFs to support

NOTE: Sources include NORC primary data, data submitted by awardees for Q11 Report (Section IV. Operational Plan C. Sustainability and Spread), and supplemental documents and communications from awardees. *NCE for administrative close out only.

Exhibit E.10: Replicating and Scaling Innovations: Selected Awardee Plans and Guidance

Awardee	Plans to Replicate or Scale	Awardee Guidance
BIDMC	Awardee will scale to 4 other practices that are not as closely affiliated as the 6 original practices ■ Add commercial payer(s) and anticipating doubling of discharges. ■ Add two staff (MSW, undergrad social worker) but not additional pharmacy or nursing ■ Prioritize staff resources by creating three tiers based on patient acuity, including low-risk 7 day PAC, 30 day PAC (current model), and high-risk intensive arm (includes home visits, coordinated with BIDCO House Calls program)	Anticipate challenge in data-sharing without single BIDMC EHR
CLTCEC	Expand training program to new geographic areas and higher enrollment (target 81,000 pairs over 5 years), under 1115 waiver once renewed	If a single state curriculum and/or apprenticeship is established for certifying IHSS providers, could incorporate CLTCEC intervention training, as well as training for CNAs
CCNC	No plans	■ Scaling considerations likely to differ for medically complex children from adults, given differences for children in specialty care services referral and delivery patterns. ■ The co-management of medically complex children could be replicated elsewhere, but the context within which CHACC operates (state-wide contract with the Medicaid office) is unique. May not be replicable beyond North Carolina, given unique health care market.
CKRI	Currently in planning phase. Allina may be part of state Medicaid demonstration (for dually eligible beneficiaries) in 2017	N/A
DDHS	No plans	Importance of capitated payer arrangements.
JHUSON	There are multiple replication pilots underway for Project CAPABLE, including ■ Michigan pilot in Flint, Saginaw and Detroit to assess possible inclusion as part of Medicaid waiver, integrated into EHR, could be part of home assessment ■ Bath, ME pilot being planned (housing authority partners with health plan to donate services of PT/OT) ■ National Center for Healthy Housing will pilot in San Diego, CA and Greensboro, NC ■ Presbyterian Health Services in New Mexico has permission to use program in 5 counties through Duals-Special Needs Plan (Medicaid) ■ Australia pilot target clients with mild cognitive impairments, challenge of appropriate targeting	■ Use national networks and/or nonprofits to staff, for example, use AmeriCorps for handymen, nonprofits for other aspects of staffing. ■ In rural areas, consider clustering patients to visit same area rather than multiple visits on different days. ■ Host organizations to have OTs and RNs on staff (e.g., home health agencies, health care systems) ■ Key components include (1) patient-directed rather than patient-centered care that focuses on functional improvements, and 92) home-based OT services (e.g., could omit handyman services for higher income households)
J-CHiP	Awardee is identifying funding sources to sustain program elements	Include behavioral health and attention to social determinants of health, as intervention likely to bring in community residents who do not have supports in place
LifeLong	Market peer counseling services and Living Well Workshops to hospitals, managed care plans, and others; partner Center for Independent Living may be supported by	With capitation, could scale ■ RN Care Management and peer coaching, for CHCs

Awardee	Plans to Replicate or Scale	Awardee Guidance
	Alameda County under federal technical assistance grant (Administration for Community Living)	▪ Partnerships between CHCs and CILs to bring IL into primary care
Northland	No plans. Prospective scaling within North Dakota if funded through Medicare ACO or Medicaid that includes dually eligible beneficiaries and those covered under Medicaid expansion	▪ Care coordinators have to be RNs to enable Medicare and/or Medicaid billing ▪ Adapt model to Clinically Integrated Network to use with different populations (e.g., pediatric, special needs), modifying assessment protocol
PCCSB	No plans	▪ Replace RNs with NPs and MDs for home triage visits, to enable billing under Medicare and/or Medicaid ▪ Leverage an existing physician practice, where relationships and staff are in place
PRHI	No plans	PCRC model (multidisciplinary team and discharge bundle) could be replicated
PPMC	Prospective replication and scaling within Oregon, at other CCOs	Trauma informed care model of outreach and patient support is replicable, if overall programmatic and financing structures permit
SCRF	No plans. Prospective inclusion as part of scope of Medicaid services under waiver (both Home Care Consultant RN for care planning and Home Care Specialist for personal care aides), but Medicaid currently in transition from FFS to MC and current focus of 4 health plans on enrollment rather than program offerings	N/A
St Francis	Prospective partnership with Hawaii Pacific Health, to implement at affiliated hospitals.	Telemonitoring component could be replicated
Sutter Health	▪ Sutter advocacy with stakeholders and CMMI to expand testing of AIM model through federal grants, expected to see test of payment models. ▪ Scale elements throughout Sutter Health corporate health care system; ▪ Market advisory services to other health care systems across the country	▪ Address policy and regulatory obstacles related to patient choice post-discharge which result in patients lost to follow up within program model ▪ Make Medicare rules more flexible to enable integration of care across the continuum, e.g., expand eligibility for skilled home health benefit, expand services covered under hospice benefit
UEMS	Awardee's model will be scaled to 7-9 additional hospital sites locally, through New York's DSRIP program	N/A
UAMS	UAMS Schmieding Caregiver Training is available for replication to interested parties throughout the United States. UAMS will continue to orient parties who purchase the curriculum from the partnering organization, Elder Stay at Home. The online training component will be scaled as demand increases. The microloan component will not be replicated or scaled	N/A
U Iowa	No plans	Strong partnership between urban hospital and rural hospitals can support replication
U New Mexico	Awardee may collaborate with New Mexico's Medicaid managed care health plans to expand eligibility criteria for the model	N/A

Awardee	Plans to Replicate or Scale	Awardee Guidance
U North Texas	Brookdale Senior Living has committed to expanding INTERACT to all 74 BSL SNF facilities around the country (using Point Click Care EHR). A similar program, not necessarily INTERACT brand name, may be implemented in the other BSL care settings Subcontractor Loopback Analytics created an IT platform that BSL sees as a competitive advantage for marketing its PAC services to hospitals. As hospitals become more committed to reducing readmissions, prospects improve for scaling The BSL pilot to implement INTERACT at its stand-alone home health agency in Nashville, TN, is developing partnerships with non-BSL facilities to replicate	BSL's data analytics subcontractor, Loopback, has created health IT systems that enable them to scale to other post-acute providers and share data with hospital corporations
URI	No plans	Awardee sees three scalable elements, including: ■ Colocation of integrated care clinic at developmental disabilities provider organization, with tailored clinic space ■ Integration of DD provider into payment methodology (e.g., ACO, bundled payment) ■ Certification of integrated care clinic for I/DD clients to be a Medicare and/or Medicaid provider
UT Houston	No plans	The model could be replicated in other sites but would require substantial institutional investment, organizational support and committed staff
VUMC	No plans. The National HealthCare Corporation, VUMC's SNF partner, may expand aspects of the intervention to its Assisted Living and Independent Living residences	The awardee's Readmission Collaborative is a vehicle for promoting their innovation model (assessment tool, case review) for use by other target groups beyond SNF patients

NOTE: Sources include NORC primary data, data submitted by awardees for Q11 Report (Section IV. Operational Plan C. Sustainability and Spread), and supplemental documents and communications from awardees.

Appendix F: Awardee-Specific Chapters

List of Exhibits, Appendix F

Overview

Each awardee chapter includes a summary overview, with an update on substantive changes since June 9, 2015, a count of participants through the awardee's Q11 report (time period ending March 31, 2015), and participant demographics. New analyses based on survey data are presented for seven awardees, and claims-based analytic results related to program effectiveness are presented for 18 awardees. Finally, the chapters include updates on surveys and secondary data analytics, as pertinent. For a more complete description of each awardee's program, please refer to this evaluation's first annual report.[70]

Exhibit F.1: Summary, Awardee Chapter Contents for NORC Second Annual Report

Awardee	NORC Admin Cohort	Survey Findings	Claims-Based Findings			Update, Data Collection & Analysis
			No External Comparison Group/Time Series	Comparison Group		Survey Development
				Difference-in-Differences	Direct Matching	
BIDMC	Post-Acute			■		n/a
CLTCEC	LTSS	■			■	■
CCNC	Specialized	■				■
CKRI	LTSS	■				■
DDHS	LTSS	■	■			■
J-CHiP	Post-Acute		■	■		■
JHU SON	LTSS		■			■
LifeLong	Specialized			■		■
Northland	LTSS	■		■		■
PCCSB	Specialized			■		■
PRHI	Post-Acute	■		■		■
PPMC	Post-Acute	■	■	■		■
SCRF	LTSS		■			■
St. Francis	Post-Acute		■			n/a
Sutter Health	Specialized	■	■	■		■
UEMS Buffalo	Specialized			■		n/a
UAMS	LTSS	■				n/a
U Iowa	Post-Acute			■		n/a
U New Mexico	Specialized	■				n/a
U North Texas	Specialized		■	■		n/a
URI	LTSS			■	■	n/a
UT Houston	Post-Acute			■		n/a
VUMC	Post-Acute			■		n/a

[70] "HCIA Complex/High-Risk Patient Targeting: First Annual Report, November 7, 2014, available at https://innovation.cms.gov/Files/reports/HCIA-CHSPT-FirstEvalRpt.pdf

Beth Israel Deaconess Medical Center

This chapter updates NORC's evaluation of the Post-Acute Care Transitions (PACT) program sponsored by Beth Israel Deaconess Medical Center (BIDMC). The PACT program aims to improve care transitions between six affiliated primary care practices and the Medical Center for Medicare fee-for-service (FFS) and dually eligible Medicare and Medicaid patients discharged from BIDMC; these six practices collectively account for about 30 percent of BIDMC's readmissions. Nurse care transition specialists (CTS), dedicated clinical pharmacists, and a social worker (MSW) are employed to coordinate care for patients with a primary care practitioner (PCP) for 30-45 days following hospital discharge. The range of care coordination and care management services provided through PACT includes patient education, medication reconciliation, referrals to social services, and communication across providers, facilitated by a medical record shared by BIDMC and the six clinics. These services are initiated during hospitalization and continue after discharge via telephonic and practice-based support, and address all potential transitions of care (including those involving home health agency providers and extended care facilities) in order to address any identified risk factors that may contribute to rehospitalization.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

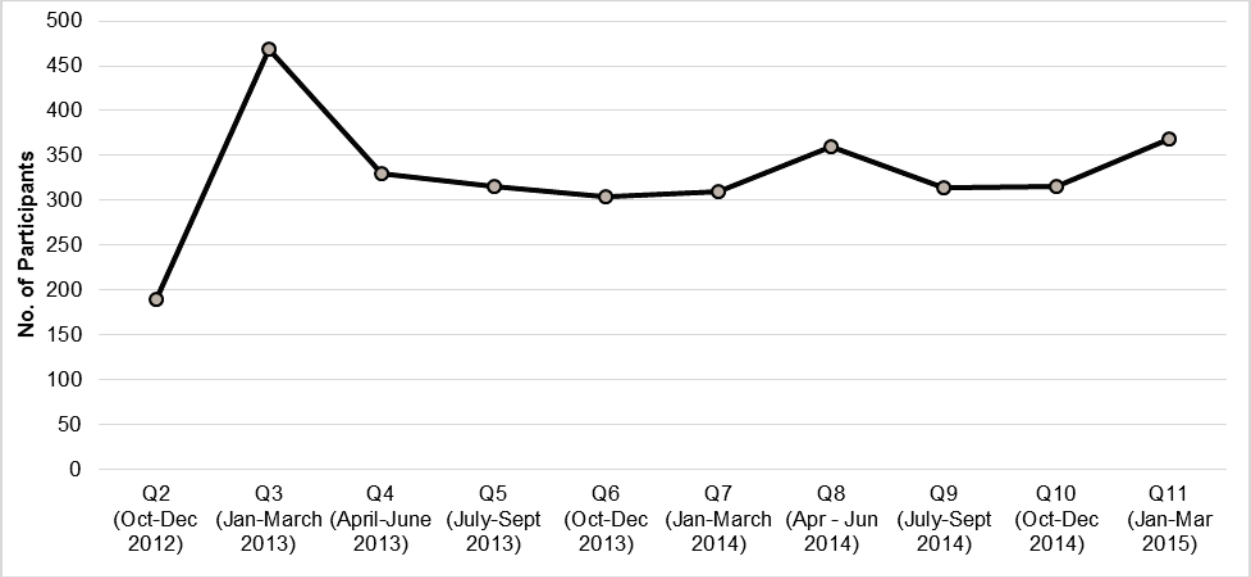
Overview of Awardee

CMMI Category for Awardee:	Acute Care Hospital
Funding Amount:	$4,937,191
Launch Date:	11/12/2012
State(s) Where Located:	Massachusetts

Patients Targeted and Served

Self-reported data from BIDMC show participation by HCIA reporting quarter, as seen in Exhibit BIDMC.1. The data show a sharp increase in participation early on, followed by a decrease and leveling off since Q4. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 369 patients. As of March 31, 2015, the PACT program had served a cumulative total of 2,236 unique participants since program launch, comprising 89 percent of the total number projected to be served over the three years of the HCIA-funded program (2,500 participants).

Exhibit BIDMC.1: Total Number of BIDMC Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Participants older than age 75 are the largest group of enrollees (46 percent). Participants ages 65 to 74 years are 32 percent of the total, and adults ages 26 to 64 years comprise 21 percent.
- Gender: Slightly over half of enrolled participants are female (52 percent).
- Racial and Ethnic Identity: Most participants are White (68 percent), with the next largest group comprised of those identified as Black or African American (24 percent). Hispanic or Latino enrollees are six percent of the total.

Update: Implementation Experience in Third Year of Award

Since NORC's first visit to BIDMC (April 2014) and our first annual report (September 2014), BIDMC continued to implement the intervention and developed innovative enhancements to improve the effectiveness of the intervention. BIDMC used carryover funding from the first year of the project to strengthen patient education using tablets and, in a pilot, provided intensive services, including home visits, to a small number of very high risk patients for six months. BIDMC also received approval from the State of Massachusetts at the end of September 2014, to continue a small scale community para-medicine pilot with Cataldo Ambulance. Under this pilot, community paramedics evaluate patients experiencing increased symptoms within the home.

Communications and Health IT. PACT implementation is aided by the use of a shared electronic medical record developed by BIDMC for its inpatient services. The six BIDMC partner clinics use the shared EMR for record-keeping purposes, which facilitates communication between the inpatient and clinic settings.

Patient and Caregiver Engagement. Patient engagement is primarily conducted by the nurse Care Transition Specialists (CTS), clinical pharmacists, and a social worker, all dually sited between the hospital and primary care practice. Patient education begins in the inpatient setting and continues with periodic telephone calls for 30 (and up to 45) days after discharge. Following a patient's discharge, the CTS contacts the patient within two days to review the discharge plan. After the initial phone call, the CTS determines the appropriate interval for telephone follow-up; at minimum, the CTS contacts the patient weekly to provide education and support and to facilitate connections with any necessary services and providers. Furthermore, the communication between PACT staff and patients is bi-directional; patients or caregivers are able to initiate contact by calling their provider, whereby the call is routed through a call center to a PACT staff member. The content of these phone calls is dictated by the patient's individual needs and tailored to each program participant. PACT staff uses motivational interviewing to encourage patients to take an active role in their own care, by meeting patients where they are and moving to the next stage collaboratively.

Fidelity, Adaptability, and Self-Monitoring. As mentioned above, PACT implemented two enhancements to the program utilizing carryover funding. The first uses new software and the convenience of tablets to increase patient engagement, activation and medication compliance for patients with chronic conditions, and the second employed an intensive management team including a hospitalist and a social worker to work with a small population of highly complex PACT patients who utilize the hospital at exceptionally high rates for a six-month period. With funding support from a foundation, BIDMC also implemented a community paramedicine pilot, under which a select group of paramedics with specialized training and oversight from BIDMC PACT staff made house visits to 20 patients experiencing urgent clinical issues that were not emergencies.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiary-episodes at BIDMC's PACT program from October 1, 2012, through September 30, 2014. We use a comparison group of FFS Medicare beneficiaries admitted to BIDMC from other referring primary care practices. We find that 30-day practitioner visit follow-up rates were significantly higher for BIDMC episodes in the post-intervention period.

Measures. Findings are presented for six measures:

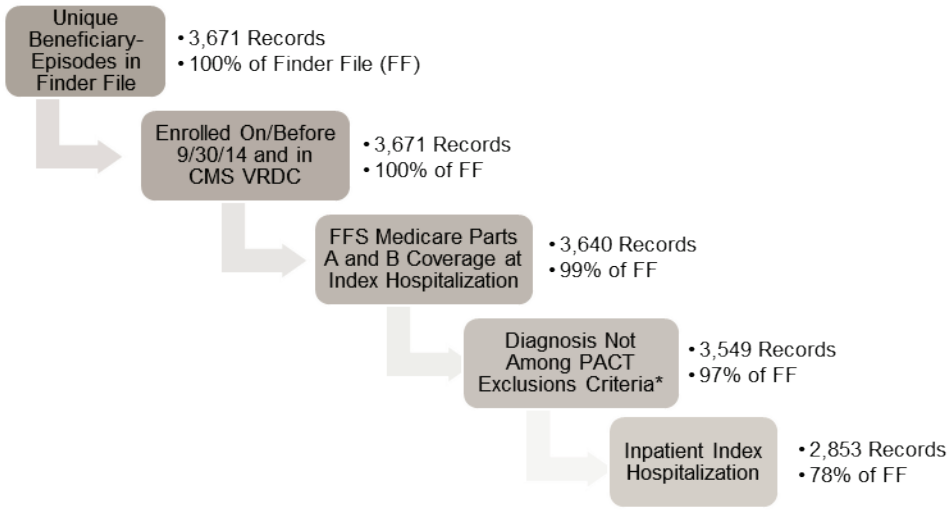
- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes
- 90-day total cost of care per beneficiary-episode
- 7-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes
- 30-day PV follow-up per 1,000 beneficiary-episodes

Research Question. For each measure, what is the difference in outcome between FFS Medicare beneficiary-episodes seen at BIDMC and those in a comparison group, after implementation of PACT, adjusting for differences in outcomes at baseline and risk factors across both populations?

Analytic Approach. We specify and employ a set of DID models, comparing outcomes for Medicare FFS beneficiaries in BIDMC's PACT program with a BIDMC comparison group in the pre- and post-intervention implementation periods. This analysis includes all members of the target group served by PACT.

Finder File and Creation of Analytic Sample. BIDMC provided a finder file that lists program participants and index hospitalization dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[71] As shown in Exhibit BIDMC.2, the finder file identified 3,671 unique beneficiary-episodes in the PACT program.[72] After ascertaining a patient's beneficiary ID in the CMS Virtual Research Data Center (VRDC), FFS enrollment status, and the patient's index hospitalization date, we arrive at a sample of 2,853 beneficiary-episodes for the PACT program in the post-intervention period.

Exhibit BIDMC.2: FFS Medicare Beneficiary-Episodes Identified Through BIDMC Finder File



* NOTE: PACT exclusion criteria include psychiatric diagnoses, obstetrics admissions, and transplant admissions.

Comparison Group. We use the Medicare claims and provider identifications in the BIDMC finder file to create internal and external comparison groups, including identification of episodes for both the pre- and post-intervention periods. While BIDMC's finder file allows us to identify beneficiary-episodes in the post-intervention period, we use claims-based rules to identify patients discharged from BIDMC that were

[71] We use Medicare claims through December 31, 2014, for the analysis in this report. We include beneficiary-episodes discharged on or before September 30, 2014 in our analyses, to allow for a beneficiary-episode length of 90 days.

[72] We use beneficiary-episodes as our unit of analysis because the awardee program treats each patient inpatient admission as an opportunity for quality improvement, and the finder file included multiple admissions for some patients.

referred by the same six affiliated practices in the pre-intervention period.[73] To create the pre- and post-comparison groups, we use claims for patients who were discharged from BIDMC but not seen at any of the six BIDMC affiliated practices. We present descriptive statistics comparing characteristics of beneficiaries in the intervention group to those from the pre-intervention as well as pre-comparison and post-comparison groups (Exhibit BIDMC.4). For more details on the methods used for this analysis, refer to Appendix C.

We use propensity score models to estimate the relative probability of a beneficiary-episode being in the BIDMC post-treatment group and calculate relative weights for beneficiary-episodes in the BIDMC pre-treatment, pre-comparison, and post-comparison groups. For more details on comparison selection and propensity score methods, see Appendix C. We incorporate these relative weights into our analysis to minimize observed differences in beneficiary-episode characteristics across BIDMC post-treatment, post-comparison, pre-treatment, and pre-comparison groups.

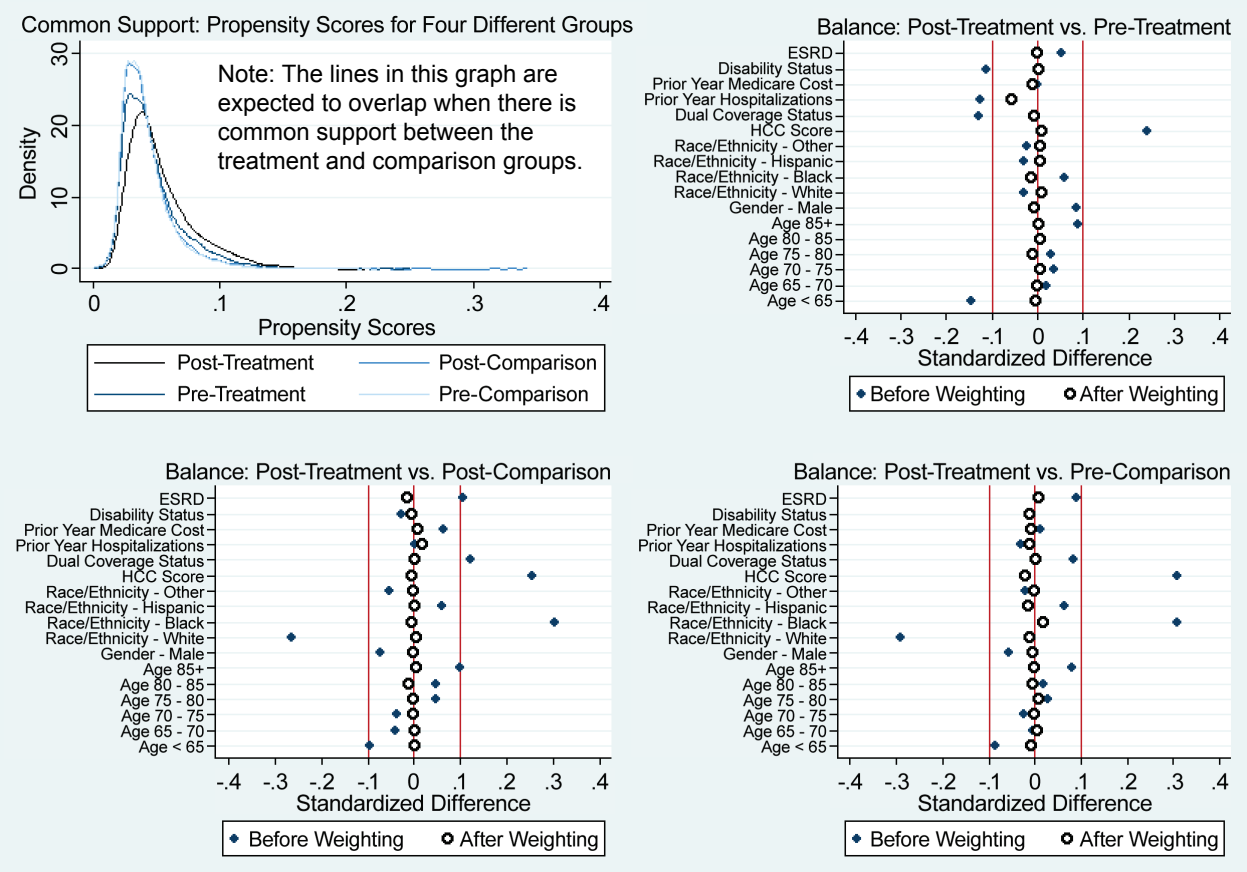
Exhibit BIDMC.3 presents common support[74] and balance in covariates across BIDMC post-treatment, post-comparison, pre-treatment, and pre-comparison group patient-episodes.

- We observe a high level of overlap in distribution of estimated propensity scores across BIDMC post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes.
- The standardized difference between BIDMC post-treatment and each of three other (post-comparison, pre-treatment, and pre-comparison) group beneficiary-episodes across all covariates is negligible after incorporating relative weights, except for prior year's hospitalizations.

[73] We only include beneficiaries that had a short-term inpatient stay at BIDMC who were discharged alive. Beneficiaries admitted to BIDMC and transferred to another inpatient facility are excluded from our analysis. We have attributed beneficiaries to one of BIDMC's six affiliated practices in the pre-intervention period if the patient had an evaluation and management (E&M) visit at one of the affiliated practices in the 30 days prior to their date of hospitalization at BIDMC. We plan to revise this attribution rule in subsequent analyses to encompass a one-year, rather than 30-day, window for E&M visits, to reduce any bias in the pre-intervention group towards patients with worsening conditions.

[74] Overlap in distribution of estimated propensity scores across BIDMC treatment and comparison group beneficiary-episodes.

Exhibit BIDMC.3: Test of Common Support and Covariate Balance



Analysis

Model. We compare the change in outcomes between treatment and comparison group, across the entire post-intervention period (October 1, 2012, through September 30, 2014) and the pre-intervention period (October 1, 2010, through September 30, 2012), in a DID analysis. We use generalized linear models (GLM) with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a GLM with a log link and gamma distribution. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1\ \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4\ \text{Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Results

Descriptive Characteristics. Exhibit BIDMC.4 displays the descriptive characteristics of beneficiary-episodes for the BIDMC intervention and comparison groups, before and after implementation of the

intervention. We compare discharges occurring in the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition). In the post-intervention period (October 1, 2012, through September 30, 2014), there are 2,853 hospital discharges attributed to the six participating BIDMC practices and 15,268 to the comparison practices, or between four and five comparators for each intervention discharge. Beneficiary-episode discharges for the intervention and comparison populations do not differ significantly in hierarchical condition category (HCC) score.

During the post-intervention period, beneficiary-episodes from the six BIDMC intervention practices are likely to be older, are three times as likely to be Black, and are more likely to be female ($p<0.01$ for all) relative to the comparison group. Also in the same period, beneficiary-episodes from BIDMC intervention practices have higher morbidity (count of HCC scores); fewer hospitalizations and ED visits; lower total Medicare cost in the past year; and are slightly more likely to have Medicare coverage due to disability, compared to episodes in the comparison group. Finally, beneficiary-episodes from the six intervention practices are less likely be discharged to a skilled nursing facility (SNF) or hospice and more likely to be discharged to a home health agency (HHA), relative to the comparison group. In this report, we use propensity score weighing described earlier, to adjust for these observed differences in baseline covariates across treatment and comparison groups.

Exhibit BIDMC.4: Descriptive Characteristics for the PACT and Comparison Group Beneficiary-Episodes, Pre and Post Implementation

Variable	Pre-Intervention		Post-Intervention	
	BIDMC	Comparison	BIDMC	Comparison
Number of Beneficiary Episodes	5,432	16,793	2,853	15,268
Age* % (N)**				
<65 years	27.5 (1496)	22.9 (3849)	24.0 (684)	23.6 (3608)
65-69 years	13.7 (745)	16.3 (2737)	15.4 (439)	17.5 (2672)
70-74 years	11.6 (632)	14.0 (2359)	12.8 (366)	15.3 (2333)
75-79 years	14.0 (760)	14.0 (2358)	13.8 (395)	13.6 (2072)
80-84 years	14.2 (773)	13.6 (2291)	13.1 (375)	12.3 (1874)
≥ 85 years	18.9 (1026)	19.0 (3199)	20.8 (594)	17.7 (2709)
Race/Ethnicity* % (N)**				
White	74.6 (4053)	85.2 (14300)	68.6 (1958)	84.9 (12958)
Black	17.9 (973)	8.8 (1480)	24.1 (688)	8.4 (1286)
Hispanic	3.2 (174)	1.5 (252)	3.2 (90)	1.5 (235)
Other	4.3 (232)	4.5 (761)	4.1 (117)	5.2 (789)
Gender* % (N)**				
Female	56.3 (3060)	51.8 (8695)	55.2 (1575)	50.8 (7753)
Hierarchical Condition Categories (HCC)				
Mean Count of HCCs (SD)***	5.6 (3.5)	5.0 (3.4)	5.6 (3.3)	5.4 (3.6)
Mean HCC Score (SD)	3.4 (2.2)	3.1 (2.1)	3.3 (2.0)	3.3 (2.2)
Mean Utilization and Cost in Year Prior to Index Hospital Discharge				
Hospitalizations per 1,000 (SD)**	2,342 (3,329)	1,895 (9,160)	1,556 (2,430)	1,720 (3,635)
ED Visits per 1,000 (SD)***	1,878 (4,377)	1,807 (4,681)	1,702 (2,948)	2,052 (5,945)
Total Medicare Cost (SD)***	$56,800 ($71,026)	$49,243 ($310549)	$44,647 ($51,846)	$49,226 ($77,779)

Variable	Pre-Intervention		Post-Intervention	
	BIDMC	Comparison	BIDMC	Comparison
Coverage Reason* % (N)**				
Age	60.6 (3290)	67.3 (11309)	62.4 (1780)	65.5 (9999)
Disability	36.1 (1963)	30.3 (5085)	34.1 (973)	32.5 (4958)
ESRD	1.0 (53)	0.7 (121)	1.6 (46)	0.9 (132)
Disability and ESRD	2.3 (126)	1.7 (278)	1.9 (54)	1.2 (179)
Discharges* % (N)**				
Home	35.2 (1910)	35.9 (6024)	32.8 (937)	32.8 (5013)
SNF	21.5 (1170)	21.3 (3582)	22.0 (628)	24.6 (3752)
HHA	32.0 (1736)	25.8 (4330)	36.6 (1045)	24.8 (3779)
Hospice	1.1 (61)	1.3 (219)	0.8 (24)	1.5 (226)
Other	10.2 (555)	15.7 (2638)	7.7 (219)	16.4 (2498)

NOTES: *p<0.10, **p<0.05, ***p<0.01.
Statistical significance assessed using chi-square tests for proportions and t-tests for continuous variables comparing BIDMC to the comparison practices during the post-intervention implementation period. Categorical variables are listed as % (N) and the count and continuous variables are listed as mean (Standard Deviation).

DID Analysis. Results presented in Exhibit BIDMC.5 represent the difference in average outcome between the BIDMC intervention group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* implementation of the intervention. This summative DID model assesses the impact of BIDMC's PACT program across the entire post-implementation period.[75]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures*:* The PACT program reduces 30-day readmissions and 90-day hospitalizations (-1 and -4 per 1,000 episodes, respectively); however, these estimates are not statistically significant. The PACT program is associated with an increase in 90-day ED visits (12 per 1,000 episodes), although this result is also not statistically significant.
- Cost*:* We observed a higher non-significant estimate for 90-day cost of care ($1,156 per beneficiary-episode) after implementation of the PAC program.
- Quality of Care Measures*:* The PACT program is associated with higher, but non-significant, 7-day practitioner visit follow-up (18 per 1,000 episodes). We observe significantly higher 30-day practitioner visit follow-up (20 per 1,000 episodes) after implementation of the PACT program.

[75] Adjustment factors include age category, race/ethnicity, gender, prior year utilization, dual eligibility indicator, hospital episode length, discharge disposition, HCC score, ESRD indicator, and disability indicator. In subsequent analyses, we plan to eliminate discharge disposition from regression adjustment because it is endogenous to the awardee's intervention.

Exhibit BIDMC.5: Difference-in-Differences Estimates for the PACT Program

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	-4 [-30, 21]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	12 [-16, 41]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	-1 [-23, 20]
90-Day Total Cost of Care per Beneficiary-Episode ($)	$1,156 [-$1,030, $3,342]
7-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	18 [-6, 42]
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	**20 [2, 38] ****

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. One limitation of this analysis is that our attribution rule for treatment group beneficiary-episodes in the pre-implementation period (see footnote 73) may be biasing this group in the direction of greater severity. We are revising this attribution rule in subsequent analyses. Also, in future reports, we plan to account for the presence of a second care coordination intervention that is available to some BIDMC patients in both the intervention and comparison populations, which is provided by the Beth Israel Deaconess Care Organization (BIDCO), a Pioneer accountable care organization (ACO), which may be affecting our estimates of the impact of the intervention.

Summary

Claims-based Analysis. Our quantitative analysis of BIDMC's PACT program shows a significant increase in 30-day practitioner visit follow-up for its beneficiary-episodes. The analysis shows non-significant decreases in 30-day readmissions and 90-day hospitalizations, as well as non-significant increases in ED visits and total cost of care. However, we are still refining our construction of the pre-implementation treatment group and of the external comparison group to improve their comparability to the post-implementation intervention group, so these results should be interpreted with caution.

Sustaining and Scaling the PACT Program. With support and investment from BIDMC, the awardee is expanding the intervention to four other practices, for a total of 10 practices implementing the intervention. BIDMC also plans to expand the intervention population to patients covered by commercial health plans, which they anticipate may double the number discharges they serve. Based on their experiences to date, BIDMC plans to stratify the population into low, moderate, and high risk, and vary the intensity of intervention services depending on a patient's risk level. While they do not have plans to add nurses or pharmacists, BIDMC will be hiring a social worker with a MSW, as well as a community resource specialist, to help address the social service needs of high-risk patients. Two of the four new practices use an EMR different from the EMR used by BIDMC and the six current practices, which may pose an additional challenge to sharing patient health care information between BIDMC and these two clinic sites. As a result of BIDMC's para-medicine pilot, PACT leadership will also be participating in a state-wide committee focused on creating a communication infrastructure to support providers who delivery health care services to patients in their homes.

References

HCIA Supplemental Report for Beth Israel Deaconess Medical Center, for Reporting Quarter End Date 6/30/2013. Submitted by BIDMC, 2013.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by BIDMC, 2015.

HCIA 11QR Quarterly Report for Beth Israel Deaconess Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by BIDMC, 2015.

California Long-Term Care Education Center

This chapter updates NORC's evaluation of the California Long-Term Care Education Center (CLTCEC) HCIA-funded program entitled "Care Team Integration of the Home-Based Workforce." The program trains pairs of Personal Care Attendants (PCAs) and Medi-Cal-enrolled clients who are enrolled in Los Angeles, Contra Costa, or San Bernardino County managed care organizations (MCOs) and who receive services through California's In-Home Support Services (IHSS) program. Training objectives include improving communication and care coordination across home and clinical settings, and improving the management of chronic disease for this predominantly dually eligible population in order to reduce ED visits, hospitalizations, and the length of stay in skilled nursing facilities. CLTCEC seeks to improve the ability of PCAs to provide better quality, patient-centered care to IHSS consumers and to integrate more effectively with the health care team. Importantly, this program engages the IHSS consumer in their own health care through the consumer's participation in the CLTCEC training program along with the PCA. The 17-module program focuses on improving caregivers' understanding of medical conditions, caregiving techniques, and integration into the consumer's health care team.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents provided by the awardee. Our focus is on results from NORC's claims-based analysis of program effectiveness, as well as findings from CLTCEC's initial workforce survey, conducted in collaboration with the University of California, San Francisco (UCSF).

Overview of Awardee

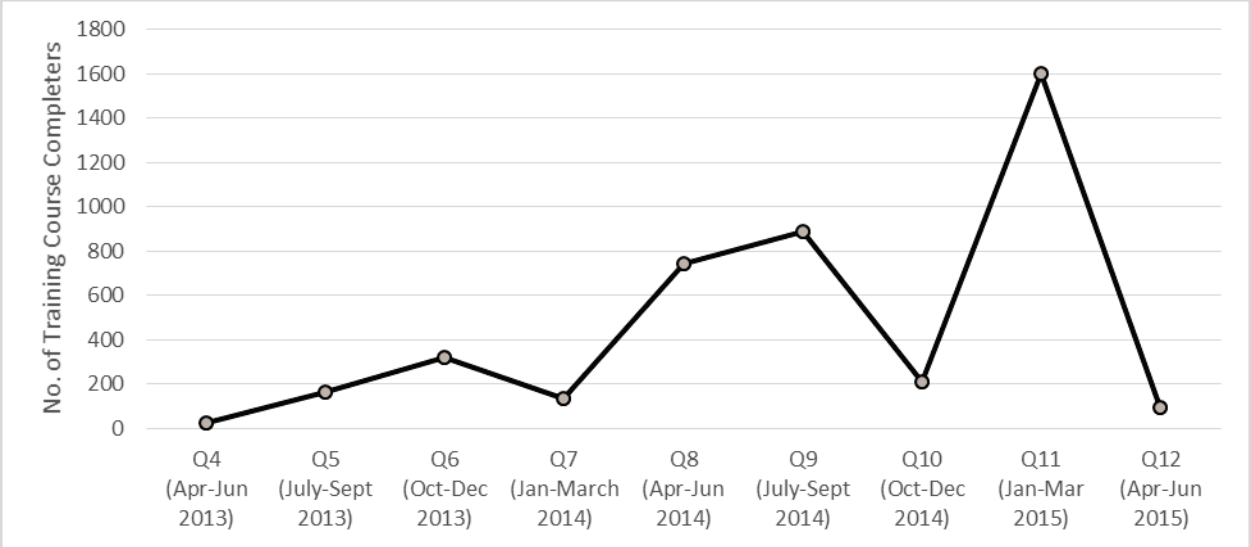
CMMI Category for Awardee:	Community College/Vocational Training
Funding Amount:	$11,831,445
Launch Date:	10/15/12
State(s) Where Located:	California

Patients Targeted and Served

Self-reported data from CLTCEC provides course completion data for trainee pairs by HCIA reporting quarter, as shown in Exhibit CLTCEC.1.[76] The data show gradual growth through Q7 followed by more substantial increases in numbers of course completers in each quarter, except for Q10. During the most recent quarter for which data are available (January 1 through March 31, 2015), 1,601 IHSS clients and a corresponding number of PCAs had completed the Care Team Integration training. As of March 31, 2015, the program had enrolled a cumulative total of 5,834 unique participants since program launch, comprising 97 percent of the total number projected to be served over the three years of the HCIA-funded program (6,000 IHSS clients, each paired with their caregivers). Of these unique participants, 4,086 completed the training program.

[76] For Exhibit CLTCEC.1, the awardee shared unpublished data with NORC. These data differ from participant counts that the awardee has submitted to CMMI as part of quarterly reporting requirements for HCIA 1 grants. While NORC has relied on the quarterly reporting data as the source for participant counts throughout this report, in the case of CLTCEC, the quarterly reporting data did not allow us to understand the impact of the intervention in terms of an unduplicated count of participants.

Exhibit CLTCEC.1: Number of CLTCEC IHSS Client Course Graduates, by HCIA Quarter



For the group of participants (Medicaid beneficiaries who are IHSS clients) directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Almost half (47 percent) are age 75 years and older, 17 percent are between the ages of 65 and 74, 28 percent are ages 26 through 64 years, and seven percent are young adults ages 19 through 25 years.
- Gender: Almost two-thirds (63 percent) are women.
- Racial and Ethnic Identity: Information on race/ethnicity is unavailable for about one-sixth of clients. Hispanics or Latinos comprise the single largest known group of clients (49 percent), followed by those identified as White (21 percent), Asian (20 percent), and Black or African American (nine percent).

Update: Implementation Experience in the Third Year of the Award

Since NORC's first site visit to CLTCEC (September 2014) and our first annual report (September 2014), CLTCEC has continued to successfully scale up its Care Team Integration of the Home-Based Workforce Program. CLTCEC has improved recruitment, increased the workforce to accommodate expansion of class locations, and increased the dialogue with various health plans in all three counties. On NORC's second site visit (April and May 2015), we further observed the implementation of the training program in San Bernardino and Contra Costa Counties and gathered updated information on the relationships with county managed care organizations and outreach efforts.

Notable updates in our understanding of the CLTCEC intervention are as follows:

Communications and Health IT. CLTCEC has worked to improve the quality of data collected about consumers at time of enrollment, focusing on documenting and quality checking the consumer's Medi-Cal number and assessing consumer evaluability to inform further recruitment practices. In addition, CLTCEC utilizes pre and post-training surveys in order to monitor IHSS provider integration onto the

consumer's health care team. The awardee also documents consumer satisfaction with the provider's involvement with the health care team.

Patient and Caregiver Engagement. In addition to helping the IHSS provider improve their own ability to care for their consumers, the CLTCEC training program encourages participant engagement by way of the IHSS consumer's central role in the training program. The consumer is the target of recruitment efforts and must actively decide to participate. The consumer then nominates and enlists the IHSS provider for the program. The consumer's autonomy and self-direction are reinforced by making the consumer central to these decisions about participation. The consumer is also present at the final module of the training course, which introduces the IHSS provider to their new role as a member of the consumer's health care team, ensuring that the consumer and the provider share a mutual understanding of the possibilities and preferred extent of the provider's role.

Fidelity, Adaptability, and Self-Monitoring. Although recruitment of IHSS consumers into the training program was initially a significant challenge, changes to recruitment strategies (e.g., transitioning from cold-calling to door knocking) had a very positive impact on enrollment, and CLTCEC is now moving steadily toward reaching its original goal to train 6,000 IHSS providers over the course of the project. In Year 3, the awardee improved data collection practices relating to patient information to improve evaluability (e.g., health identifiers) and improved recruitment practices to over-recruit for subsets that were more likely to have attrition.

Focus on recruitment and retention of trainees throughout the course has paid off. Self-monitoring via pre-and post- surveys of trainees and trainee focus groups about curriculum have allowed the teachers to adapt to what works best in each participating county and both trainees and consumers report satisfaction with the training received. The teaching workforce in LA and San Bernardino has grown from 8 to 13, to accommodate expansion of class locations, and word of mouth and referrals by peers has resulted in some waiting lists for future courses. Furthermore, providers/trainees are interested in additional classes and CLTCEC is working on an extended second-level curriculum.

The awardee has encountered a number of challenges with regard to the integration of the IHSS provider into the consumer's health care team. The program has adjusted to the Medicaid Coordinated Care Initiative (CCI) and the demands that transformation has placed on MCOs. CLTCEC has begun to reach out to provider groups to present the potential of IHSS workers as care team members and the dialogue with various health plans in the three counties has increased. Although the awardee has discussed obtaining data (e.g., counts of interactions of IHSS workers with health plan staff) on the integration of IHSS workers, CLTCEC has experienced challenges in this regard, as health plans currently lack the resources to prepare such data.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an awardee. We present initial findings on hospitalizations and emergency department (ED)

visits for CLTCEC program participants and a comparison group. We also present an initial analysis of trainee experiences with the CLTCEC intervention, from CLTCEC/UCSF's workforce survey.

Claims-Based Analysis

NORC's capacity to evaluate CLTCEC is limited by our lack of complete claims data. In January 2015, we began to receive claims data from four Medi-Cal health plans, listed below.

- Care1st Health Plan (Care1st), in Los Angeles County
- Contra Costa Health Plan (Contra Costa), in Contra Costa County
- Inland Empire Health Plan (IEHP), in San Bernardino County
- Molina Healthcare of California Partner Plan, Inc. (Molina), in Los Angeles and San Bernardino Counties

We are also seeking to develop a data use agreement with L.A. Care, another major health plan in Los Angeles County. NORC is working with data analysts and leadership from these plans and CLTCEC to increase the scope of data made available for our evaluation and to construct CMS core measures for subsequent analyses.

Results

In Exhibit CLTCEC.2, we present descriptive characteristics for CLTCEC program participants and the comparison group. The mean age for both CLTCEC participants and comparators is approximately 57 years. We observe that the CLTCEC participants have a lower proportion of women relative to the comparison group ($p<0.10$). We also observe a higher proportion of White participants and Hispanic participants in the CLTCEC participants relative to the comparison group and a lower proportion of Black participants ($p<0.01$).

Exhibit CLTCEC.2: Descriptive Characteristics for CLTCEC Program Participants and Comparators, Reported from Four Medi-Cal Plans

Variable	CLTCEC	Comparison
Number of Persons	279	2410
Mean Age (Standard Deviation)	56.7 (20.5)	57.3 (18.2)
Gender* % (N)		
Female	59.1 (165)	64.9 (1563)
Race* % (N)**		
White	31.9 (89)	26.6 (641)
Black	22.6 (63)	34.9 (840)
Hispanic	27.2 (76)	13.2 (319)
Other	6.8 (19)	16.0 (385)
Unknown	11.5 (32)	9.3 (225)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

In Exhibit CLTCEC.3, we present the number of patients from each of the four plans in the treatment and comparison population that have a hospitalization or ED visit. Combining the data across the four plans,

we observe a similar rate of hospitalizations in both the treatment and comparison groups. However, the ED visit rate in the comparator pool is 17 percent higher than is the rate among the CLTCEC participants.

Based on our initial review of the files provided by the health plans, we note fairly small sample sizes across the plans. The health plans have limited ability to share information for comparators, especially from L.A. County, due to difficulties in identifying participants and generally limited information. We also observe that Contra Costa data show higher utilization, compared to that seen in the other plans. Only the Contra Costa program, operated under subcontract with CLTCEC, has been able to identify and recruit IHSS clients using the health plan's claims-based risk algorithm that the awardee intended to use in all locations; this may be one reason for that plan's higher utilization, along with other sources of non-comparability.

Exhibit CLTCEC.3: Utilization Information from CLTCEC Health Plans

Health Plan	Number of Medi-Cal Beneficiaries		Utilization Measures			
			Hospitalizations % (N)		ED Visits % (N)	
	CLTCEC clients	Comparators	CLTCEC clients	Comparators	CLTCEC clients	Comparators
Care1st	102	40	36 (39)	20 (8)	51 (54)	40 (16)
Contra Costa	120	2,354	38 (45)	39 (919)	68 (81)	72 (1,684)
IEHP	14	5	50 (7)	20 (1)	43 (6)	60 (3)
Molina	38	11	21 (8)	18 (2)	26 (10)	0 (0)
Totals	279	2,410	35 (99)	39 (930)	54 (151)	71 (1,703)

Limitations and Next Steps. Our ability to assess the utilization experience of IHSS clients whose PCAs participated in the Care Team Integration training program is extremely limited at this point. Specifically, the numbers of IHSS clients and comparators reported by the health plans are small, and the health plan data both limited to hospitalizations and ED visits and potentially non-comparable. As previously discussed, the evaluation continues to work with the health plans to receive more robust data sets. Where feasible, we plan to implement propensity score matching of the intervention and comparison groups, and present adjusted results for the core outcome measures based on health plan data.

Survey of Workforce Trainee Experience

CLTCEC shared data from the awardee's initial (2013) round of pre- and post-training surveys designed and analyzed by their internal evaluator, University of California, San Francisco School of Nursing (UCSF). These surveys support CLTCEC in monitoring IHSS providers' satisfaction with and perceived effectiveness of the training to improve their home care skills and to take a more active role as part of the consumer's health care team. Six hundred and thirty (630) individuals completed at least one survey in that first round. This iteration of the survey does not use a formal pre- and post-survey design; rather, trainees are asked whether they noticed or experienced a change within a certain time period. In 2014, the survey instruments were revised, to reflect a redesign of the Care Team Integration training curriculum. The 2014 surveys will become available to NORC later in this calendar year and will provide a better picture of the current training program from the viewpoint of trainees, compared with the survey results from the program's first year.

Here we present descriptive statistics from this initial data collection. Exhibit CLTCEC.4 presents descriptive statistics for the Care Team Integration of the Home-Based Worker survey. Most caregivers are female (87 %), with no more than a high school education. Eighty-one percent (81%) have worked as an IHSS Provider for more than two years, and more report caring for a family member than for a friend (the only two client designations).

Exhibit CLTCEC.4: Descriptive Characteristics, 2013 CLTCEC Post-Trainee Survey Respondents

Variable	Value
Gender % (N)	
Female	86.7 (546)
Mean Age	52.6
Education % (N)	
None	3.1 (13)
8th grade or less	23.9 (100)
Some high school	23.4 (98)
High school or GED	14.8 (62)
Some college	14.8 (62)
Technical or trade/vocational school certificate	6.5 (27)
Associate's degree	4.8 (20)
Bachelor's degree	5.3 (22)
More than 4 years of college	3.4 (14)
Length of Time Working as an IHSS Provider % (N)	
Less than 3 months	1.5 (6)
3 months to 6 months	2.9 (12)
7 months to 12 months	3.9 (16)
1 year to 2 years (12 months to 24 months)	10.5 (42)
More than 2 years (more than 24 months)	81.1 (362)
Caring for a Friend % (N)	
Caring for a friend	13.8 (53)
Number of Friends % (N)	
One	79.2 (38)
Two	14.6 (7)
Three	4.1 (2)
Four or more	2.1 (1)
Live with person you are caring for	41.2 (21)
Caring for a Family Member % (N)	
Yes	67.3 (251)
Number of Family Members % (N)	
One	82.6 (204)
Two	14.2 (35)
Three	2.8 (7)
Four or more	0.4 (1)
Live with person you are caring for	70.3 (170)

Almost all caregivers (92-99 %) report high satisfaction with their training overall and with aspects of the experience, including skills learned and confidence in being able to successfully implement the new skills learned. Roughly half of the caregivers surveyed report increased involvement in the health care decisions and overall health care discussions about the individual for whom they provide care (Exhibit CLTCEC.5).

Exhibit CLTCEC.5: Selected Results from 2013 CLTCEC Trainee Survey

Variable	% Reporting "Great Increase" in Involvement with Consumer's Care
Involvement in Consumer's Care	
The extent to which I am involved when my consumer goes to the doctor or other health care provider	49
The extent to which my consumer wants doctors/nurses/other health care providers to speak with me about my consumer's medical condition	46
The extent to which my consumer wants doctors/nurses/other health care providers to speak to me about my consumer's health and well-being	43
How often your consumer involves you in discussion about their health care	47
How often your consumer involves you in decisions about their health care	47

Summary

Claims-based Analysis. Our quantitative analysis of the CLTCEC program shows a similar rate of hospitalizations in both the treatment and comparison groups and a higher ED visit rate in the comparator pool than among the CLTCEC participants. Key limitations of this analysis are 1) small sample sizes, 2) limited information, and 3) potentially non-comparable information from the plans.

Workforce Survey. Our initial review of the awardee's 2013 workforce survey data finds that IHSS Providers are satisfied with the Care Team Integration training, and that many report greater involvement with various aspects of their client's health care. As mentioned above, NORC will conduct a more thorough analysis and assessment of trainee satisfaction with their training program using pre- and post-training data from the revised 2014 workforce survey, which corresponds to CLTCEC's revamped curriculum and course format.

Sustaining and Scaling the CLTCEC Program. CLTCEC received a full no-cost extension under which they are offering IHSS provider-client courses in seven counties and updating content specific to California. Pending the renewal of the state's 1115 waiver and integration into the Coordinated Care Initiative (CCI) work plan for the state, CLTCEC plans to expand the training program to new geographic areas and higher enrollment (i.e., target 81,000 pairs over 5 years). If a single state curriculum and/or apprenticeship is established for certifying IHSS providers, CLTCEC intervention training could be incorporated. In addition, the training program could also be extended to train other types of workers such as certified nursing assistants (CNAs).

Data Collection and Analysis: Survey Development

NORC expects to receive additional pre- and post-training data from CLTCEC/UCSF's revised (2014) workforce trainee survey, as well as pre- and post-training consumer survey data by the end of 2015. In future reports, we will present results from the analysis of the 2014 workforce survey as well as the analysis of CLTCEC/UCSF's pre- and post-training consumer survey.

References

"Care Team Integration of the Home-Based Workforce IHSS Worker 2 Post-Training Survey." CLTCEC, 2015.

"Care Team Integration of the Home-Based Workforce Worker 1 Pre-Training Survey." CLTCEC, 2015.

"CLTCEC Draft Revision of Driver Diagram for Review." CLTCEC, 2014

"CLTCEC Survey Data." edited by CLTCEC, 2015.

"Consumer and Worker Survey Analysis." 1-21: CLTCEC, 2015.

Final Report - St. John's Enhanced Home Care Pilot. Tides Foundation – Community Clinics Initiative; CLTCEC, 2013.

HCIA 5QR Supplemental Documentation: The California Long-Term Education Center. Submitted by CLTCEC, 2014.

HCIA 11QR Supplemental Documentation: The California Long-Term Care Education Center. Submitted by CLTCEC, 2015.

HCIA 11QR Sustainability Plan: California Long-Term Care Education Center. Submitted by CLTCEC, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by CLTCEC, 2015.

HCIA 11QR Quarterly Report for the California Long-Term Care Education Center, for Reporting Quarter End Date 3/31/2015. Submitted by CLTCEC, 2015.

"Post-Training Focus Group Report." 1-21: CLTCEC, 2015.

UCSF Evaluation Overview of Key Components. University of California San Francisco, 2014.

"Voice for Better Care: Care Team Integration CMMI Worker 1 Pre-Survey." CLTCEC, 2014.

"Voice for Better Care: Care Team Integration CMMI Worker 2 Post-Survey." CLTCEC, 2014.

Community Care of North Carolina

This chapter updates NORC's evaluation of the Community Care of North Carolina (CCNC)'s Child Health Accountable Care Collaborative (CHACC).[77] CHACC aims to improve health outcomes, patient and caregiver experiences, and cost-effectiveness of care delivered to medically complex children served by CCNC who are enrolled in Medicaid or the Children's Health Insurance Program. The intervention uses CHACC's existing statewide network, which includes 14 academic and tertiary medical centers, to integrate pediatric specialty care into primary care through care coordination, promulgation of clinical practice guidelines, and the engagement of family caregivers. Co-management of complex care is a key aspect of this intervention, a model designed to fill the gaps where communication can falter between the numerous specialists who care for medically complex children and their primary care provider or patient-centered medical home. CHACC is a smaller program within the larger CCNC structure, drawing upon the resources of other CCNC care coordination programs to administer this intervention. HCIA funds have been used to further develop and spread the CHACC program within the statewide network.

We provide an update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on findings from NORC's survey of CHACC's workforce and training experience.

Overview of Awardee

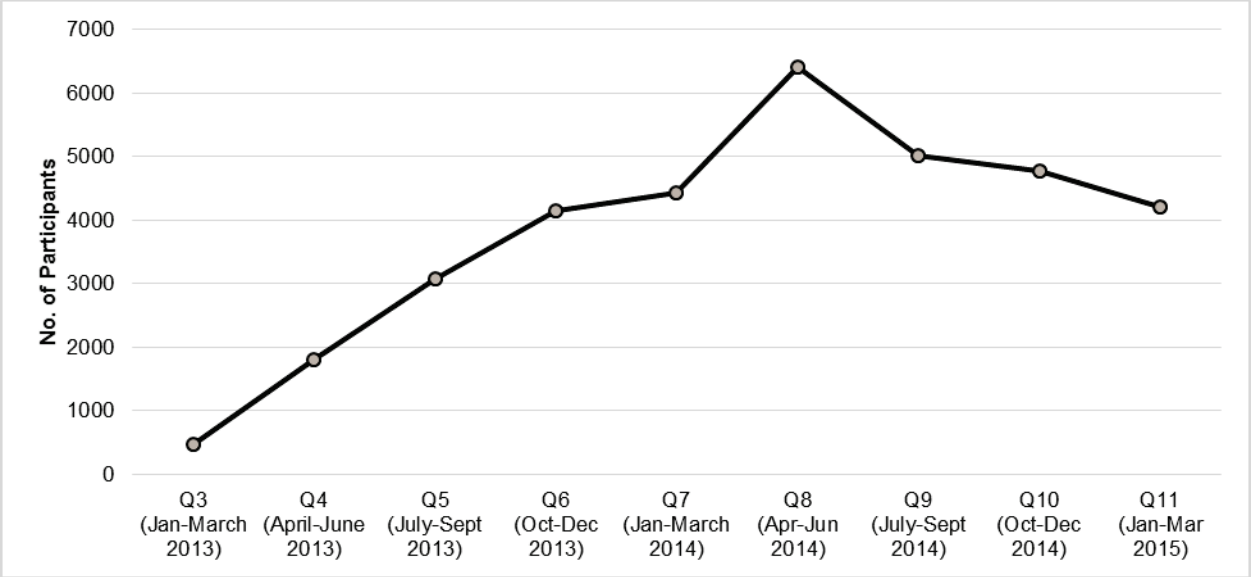
CMMI Category for Awardee:	Community Based Organizations
Funding Amount:	$9,343,670
Launch Date:	1/15/2013
State(s) Where Located:	North Carolina

Patients Targeted and Served

Self-reported data from CHACC provides participation by HCIA reporting quarter, as shown in Exhibit CHACC.1. The data show a steady increase through Q8 with a subsequent decline through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), CHACC served 4,201 participants. As of March 31, 2015, CHACC has served a total of 12,410 patients since program launch, 76 percent of the total number projected to be served over the three years of the HCIA-funded program (16,257 participants).

[77] Please note that as of NORC's fifth report, NORC has changed the name used in this report to refer to the awardee, from the name used in previous reports to CMMI (North Carolina Community Care Network). Community Care of North Carolina is the name that the organization uses. Please see www.communitycarenc.org/emerging-initiatives/child-health-accountable-care-collaborative.

Exhibit CHACC.1: Total Number of CHACC Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Well over half are children ages one through 11 years (68 percent), 21 percent are adolescents ages 12 through 18 years, six percent are infants older than one month and less than one year of age, and an additional six percent are young adults ages 19 through 21 years old.
- Gender: About half of participants are male (53 percent).
- Racial and Ethnic Identity: Over half are identified as White (55 percent), with 43 percent identified as Black or African American.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit to CHACC (November 2014) and our first annual report (September 2014), CHACC has experienced challenges with budget cuts and access to Medicaid claims data.

The program faced significant Medicaid budget cuts from January 2015 onwards, resulting in layoffs of CHACC staff, which included the lead data analyst. Lack of access to Medicaid claims data was also identified by CNCC as a continued barrier to prospective patient recruitment, monitoring of implementation, and feedback of useful information to sites for use in modifying or tailoring implementation to improve outcomes.

On NORC's second site visit (May 2015), we observed implementation at two sites (East Carolina University and Duke University Medical Center) that we had not previously visited and interviewed the CCNC-affiliated network directors who oversee coordination of Medicaid-supported care across the state. CNCC did not receive a no-cost extension for CHACC. Thus, during the second site visit, CHACC was in its last month of operation and focused upon supporting individual sites and the central program as elements of the CHACC intervention were integrated into ongoing care coordination for Medicaid-enrolled children served by CCNC across the state. The CHACC central program office was working on

continuing its collaboration with selected sites. Site visit discussions with leadership included the awardee's proposal to create a Clinically Integrated Network. CHACC leadership helped draft a bill before the North Carolina state legislature that could transform the Medicaid program into an ACO type structure (Clinically Integrated Network) that would be publicly held, rather than operated by private Medicaid managed care organizations, and allow key elements of the CHACC program to be sustained.

Communication and Health IT. CHACC has a complex IT infrastructure that involves several different programs for communication and documentation. Through the CCNC system, care managers document their process and care plans in a program called Case Management Information System (CMIS). The care plan and patient summary is uploaded to a provider portal, which is available to both providers and care managers. Alternatively, some providers communicate solely through their EHR. While partner networks and providers can log onto CMIS or gain access to CHACC-related records by means of a provider portal, discussions during the second site visit revealed that many providers are reluctant to do so and, most often, prefer to receive to receive the information by fax.

Parent caregivers of CHACC patients receive hard copies of their child's summary documents (including a Patient Treatment Snapshot) in a three-ring binder and are encouraged to bring this binder with them to all appointments. The snapshot document is similar to a hospital discharge summary but in more succinct form, assembling key information about diagnoses, allergies, feedings, therapy, durable medical equipment, follow up appointments, medications, and plans of care for each specialist.

Patient and Caregiver Engagement. While CCNC presents the CHACC project as fundamentally about medical co-management or improving communication between specialists and community-based pediatricians, a secondary emphasis of the program is parent caregiver engagement. Engaging caregivers involves education about symptom management, medication reconciliation, articulation of family-centered goals and developing action plans to achieve these goals, referrals to community benefits and services (e.g., transportation, durable medical equipment), and health care system navigation. The degree of parent engagement activity appears to vary by site and the capacity or limits of other care coordination programs available locally. Both CHACC specialty care managers (RNs or social workers) and patient care coordinators (non-clinical navigators) may take part in one or more engagement tasks. Sites may leverage CHACC as an opportunity for caregiver engagement but do not receive formal supports (e.g., health IT, training, operating protocols) that address engagement specifically, other than the care plan that is to be shared with parent caregivers.

Fidelity, Adaptability, and Self-Monitoring. The structure of the CHACC program lends itself to adaptability, as each of the 14 sites requires modifications and adaptations to successfully implement the program in that site. Each site has different care coordination needs in their area and has adjusted the CHACC relationship to fill gaps in care coordination locally. The overall program also adapted well. For example, the initial CHACC plan to use a risk algorithm to identify prospective patients based on Medicaid claims did not work, due to lack of access to claims. In spring 2014, CHACC switched to a protocol that uses hospital ADP data feeds, claims data provided by hospitals, and physician referrals to find potential patients.

CCNC has fielded two surveys on school and work days missed and on parent satisfaction (including communication) to monitor caregiver engagement. However, only limited data on the effectiveness of caregiver supports is available from NORC's two site visits, from one focus group with parents (2014) and from interviews with CHACC staff. Focus group participants highlighted a sense of being more in control or better able to manage their child's conditions and their medical needs. In many cases, it is difficult to clearly distinguish the impact of CHACC from that of the other care coordination programs with which CHACC is typically administered.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. NORC's capacity to evaluate CHACC is limited by our lack of access to timely Medicaid data for North Carolina. In January 2015, the CCNC team began to receive Medicaid claims from the state but has not been able to share these data with NORC. We have coordinated with CCNC data analysts and leadership to construct measures, which CCNC has shared with NORC. The awardee has shared some of their initial findings, noting that the program appears to have the greatest potential for impact when patients are enrolled following an inpatient admission. When enrolling these patients, there was a statistically significant reduction in hospitalizations, ED visits and overall cost. An important limitation to these findings is that NORC is unable to validate them since we do not have access to the data.

Previously, we reported a usability analysis and descriptive statistics for parent and child survey data shared with NORC by CCNC. In this report, we present an initial analysis of work and training experiences of CHACC staff, from NORC's workforce survey. Overall, CHACC staff report satisfaction with training, supervision, teamwork, and job tasks.

Survey of Workforce Trainee Experience

NORC collaborated with CCNC to tailor a questionnaire for their intervention and included site-specific questions requested by CCNC. The workforce survey sample (N=42) was provided by CCNC. Data collection began on May 14, 2015 and ended on June 5, 2015. Because of the small sample, we did not test for statistical significance of our findings.

Results

Description of Survey Respondents. Of the 42 staff invited to participate, 29 employees completed the NORC workforce survey. Over half (55 percent) of respondents have worked on the CHACC project for 2 or more years, 31 percent have worked on the project for 1-2 years, and 10 percent have worked on the project for less than one year. Only 35 percent of respondents have worked with CCNC on a care coordination project prior to CHACC.

Most respondents are female (90 percent) and White (79 percent). The average age of respondents is 46 years, and respondents have an average of 15 years' experience working directly with patients. Exhibit

CCNC.2 presents information about the job title and education level of the respondents, and Exhibit CCNC.3 details the activities performed by CCNC staff members.

Exhibit CHACC.2: Job Title and Education Level, CCNC Staff

Variable	Value
Job Title % (N)	
Patient Coordinator	24 (7)
Care Manager	35 (10)
Lead Care Manager	28 (8)
Other	13 (4)
Highest Level of Education % (N)	
High school or GED	3 (1)
Some college or trade school	7 (2)
Certified Nurse Assistant	0 (0)
College graduate	55 (16)
Master's, clinical	14 (4)
Master's, non-clinical	7 (2)
Doctorate (medicine, nursing, dentistry, social work, clinical psychology)	0 (0)
Other	7 (2)
Missing	7 (2)

Exhibit CHACC.3: Activities Performed by CCNC Staff, by Staff Type

Activity	All CCNC Respondents (n = 29)	Patient Coordinator (n = 7)	Care Manager (n = 10)	Lead Care Manager (n = 8)
	% (N)			
Referrals	76 (22)	100 (7)	80 (8)	75 (6)
Follow-up with patients	83 (24)	100 (7)	100 (10)	75 (6)
Patient education/ patient/caregiver education	76 (22)	71 (5)	100 (10)	75 (6)
Disease management	48 (14)	0 (0)	70 (7)	75 (6)
Symptom management	55 (16)	14 (1)	90 (9)	63 (5)
Visits by phone	62 (18)	86 (6)	80 (8)	50 (4)
Binder and other personal engagement tools	52 (15)	71 (5)	70 (7)	25 (2)
Navigating health care system	69 (20)	86 (6)	90 (9)	50 (4)
Patient recruitment	52 (15)	57 (4)	60 (6)	50 (4)
Coordinate communication with physicians and care coordinators	83 (24)	100 (7)	100 (10)	75 (6)
Other	31 (9)	43 (3)	0 (0)	38 (3)

Development and Training

Participants report that each of the training courses was useful, though many find them to be only moderately useful.

- Training related to CCNC: 52 percent find to be very useful and 31 percent moderately useful
- Ongoing CHACC training: 41 percent find to be very useful and 35 percent moderately useful
- Network training. 46 percent find to be very useful and 54 percent moderately useful

The usefulness of the various informal training opportunities differs by job function.

- Most lead care managers (85 percent) and care managers (70 percent) find "informal conversations as needed" to be very helpful. A smaller majority (57 percent) of patient coordinators find "informal conversations as needed" to be very useful.
- Only 24 percent of respondents note that the monthly CHACC conference calls were very useful, but 48 percent indicate they were moderately useful. Notably, 28 percent find the monthly conference calls to be not at all useful.
- Patient coordinators find shadowing to be more useful than did care managers. While all but one of the patient coordinators who received shadow training find it very useful, only half of the care managers find it very useful (the other half indicate moderately useful).
- Five of the patient coordinators report taking community college courses. Three found them helpful while two did not.

CCNC staff judged informal training as most useful.

- Lead care managers: 62 percent cite informal conversations as needed.
- Care managers: Opinions vary greatly, with a plurality (43 percent) citing shadowing.
- Patient coordinators: Opinions vary greatly, with a plurality (43 percent) citing shadowing.

Respondents generally note that the trainings prepared them for various aspects of their jobs on the CCNC project.

- 72 percent report feeling prepared to work with other providers; 69 percent feel prepared to use technology; and 59 percent prepared to meet the needs of their patients.

Workforce Deployment: Stress

Exhibit CHACC.4 presents information on how respondents reported the balance between stress and reward levels in their work. Each cell in the table presents the percentage of respondents who reported both a given stress level and a given reward level. Cells are shaded in darker orange colors where a higher proportion of respondents reported the same combination of stress and reward.

CCNC staff report moderate levels of stress while also experiencing the work as rewarding.

- The majority (59 percent) indicate that their work-related stress stayed about the same after joining the CHACC project, although 17 percent noted their stress increased and 21 percent noted their stress decreased.
- When asked to assess the balance between stress and reward in their role at CHACC, respondents are most likely to describe their work as both moderately stressful and highly rewarding (66 percent).

Exhibit CHACC.4: Balance between Stress and Reward Levels, CCNC Staff

Stress Level, (% Reporting)	Reward Level, % Reporting		
	High	Moderate	Low
High	0	6.9	0
Moderate	65.5	10.3	3.4
Low	3.4	3.4	3.4

Workforce Deployment: Teamwork and Support

Most respondents report that the information they provide to patients and other clinicians has had an impact.

- Most respondents strongly agree (33 percent) or agree (48 percent) that the information they provided to other providers was used for clinical decision-making; 19 percent selected neither agree nor disagree.
- All respondents indicate that working in collaboration with a team of health care providers had a positive impact on the quality of care that patients receive.

Respondents are more likely to identify peers and shadowed staff as "most helpful" than they are leadership, supervisors, or trainers.

- Peers and shadowed staff are reported to be the most helpful, with 70 percent and 95 percent, respectively, found to be very helpful.
- Fifty (50) percent find the leadership team to be very helpful, while fewer find supervisors (41 percent) and trainers (33 percent) to be very helpful.

CCNC staff report that they receive a variety of feedback and support from their supervisors and team members.

- Most (82 to 96 percent) indicate that their supervisors or managers, as well as team members, provide suggestions and support on things they can improve; offer feedback on things they are doing well; and assist with problem solving or advice. Seventy six percent of respondents agree or strongly agree that they get the help and support they need to do their job.
- Fourteen percent indicate that the feedback they receive compares their performance to the performance of their colleagues; this may reflect the perception that few staff shared similar roles.

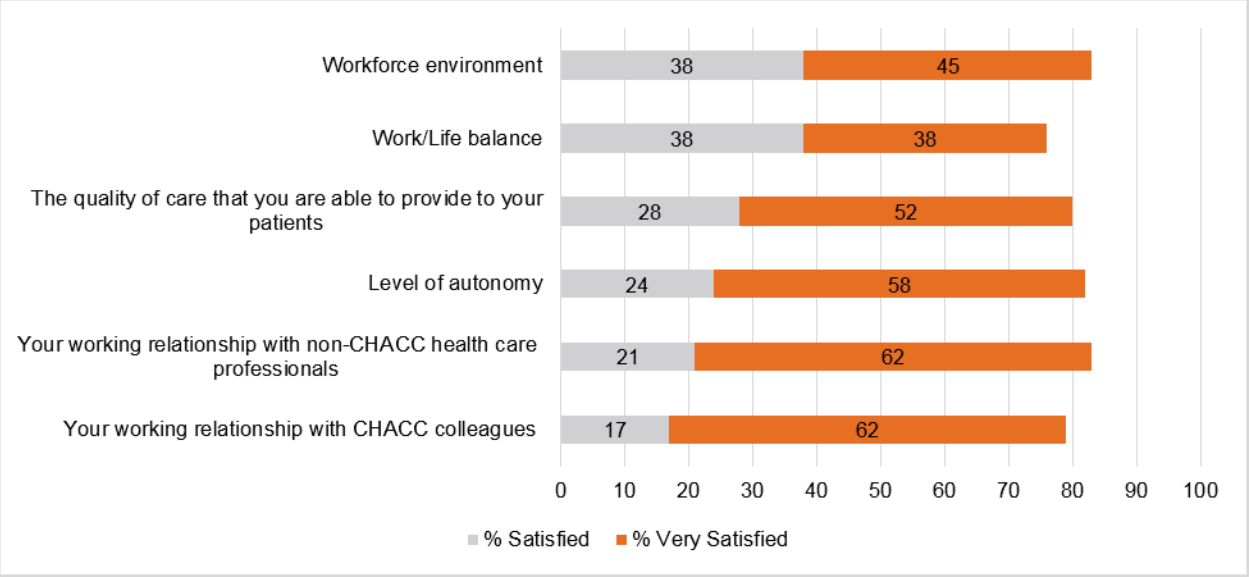
Satisfaction

Overall, respondents are satisfied with many aspects of their jobs.

- While the majority are satisfied with their job on the project, 10 percent are neither satisfied nor dissatisfied and 3 percent are somewhat dissatisfied.

- About two-thirds of respondents (66 percent) report that they wanted to stay at their job, all else being equal. We would note that the survey was conducted within two months of end of the original three years of HCIA funding. CCNC staff did not know whether the HCIA funding period would be extended at the time of the survey, so "all else being equal" was added to the question, so that responses to this question reflect overall job satisfaction.[78]
- Overall satisfaction (percentage reporting very satisfied or satisfied) across six components of CHACC work are close to 80 percent, with variation within each component among the percentage that report being very satisfied; see Exhibit CHACC.5 for a summary.

Exhibit CHACC.5: CCNC Staff Satisfaction with Aspects of Job



Summary

Workforce Survey. Our initial review of CCNC survey data indicates that the program has several outcomes of interest. Though the usefulness of various training opportunities differed by job function, CCNC staff judge informal training as most useful, especially informal conversations and shadowing. Respondents are satisfied with many aspects of their jobs, particularly with their working relationship with other staff and their level of autonomy. We will continue to work with the CCNC team to obtain an integrated file of patient satisfaction survey data, as well as to establish a data sharing agreement related to Medicaid claims. In future reports, we plan to review claims-based analysis conducted by the CCNC team.

Sustaining and Scaling the CHACC Program. In terms of sustainability, each organizational site will decide whether and how to sustain intervention. In some cases, sites' provider networks and health care systems are funding the interventions in the short term or folding the intervention into other programs. CHACC leadership has proposed an Innovation Center and Clinically Integrated Network (CIN) for

[78] The CCNC program did not receive a no-cost extension beyond June 30, 2015.

pediatrics in the state, which would be supported by Medicaid program and would sustain elements of the CHACC program. Legislation is pending on whether Medicaid will enable the proposed provider-led CIN.

Scaling CHACC may prove difficult as the program operates in a unique context, through a statewide contract with North Carolina Medicaid. Implementing this program in a different population may also be tough to replicate as scaling considerations are likely to differ between medically complex children and adults, given the differences in pediatric specialty care services referral and delivery patterns. However, it would be possible to replicate some key aspects of the intervention, such as the co-management of medically complex children, in other settings.

References

"CHACC: Missed School/Work Survey." CCNC, 2015

"CHACC Parent Survey." CCNC, 2015.

"CHACC Sustainability Plan." CCNC, 2015.

"Child Health Accountable Care Collaborative Initial Findings from Evaluation." CCNC, 2015.

"Cover Page Template for Use on Uploaded Work or Pdf Document." North Carolina Community Care Networks, 2013.

"Data Collection Tool." CCNC, 2015.

HCIA 11QR Quarterly Report for Community Care of North Carolina, for Reporting Quarter End Date 3/31/2015. Submitted by CCNC, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by CCNC, 2015.

Jackson CT, Trygstad TK, DeWalt DA, and DuBard CA. "Transitional Care Cut Hospital Readmissions for North Carolina Medicaid Patients with Complex Chronic Conditions." *Health Affairs* 32, no. 8 (2013): 1407-1415.

"North Carolina Child Health Accountable Care Collaborative." CCNC, 2014.

Stiles, AD. "Comanagement of Medically Complex Children by Subspecialists, Generalists, and Care Coordinators." *Pediatrics* 134, no. 2 (2014): 3.

Courage Kenny Rehabilitation Institute

This chapter updates NORC's evaluation of Courage Kenny's Advanced Primary Care Clinic (APCC). Courage Kenny's intervention adapts an existing Health Care Home (medical home) model to serve a selected population of Medicaid or dually eligible patients with physical disabilities, including spinal cord injury, traumatic brain injury, cerebral palsy, and musculoskeletal conditions. The APCC offers tailored access to primary and specialty care, including virtual consultations using telemedicine, clinic-based care coordination, referrals to community resources, and patient engagement. In addition to receiving care from a physician or nurse practitioner (NP) at the clinic, clients have a care coordinator (CC) who plays a vital role in the management of the care and management of the client's health. The care team may also include an independent living skills (ILS) specialist, a psychologist, a nutritionist/dietician, and/or a social worker. The goals of the intervention are to reduce the number of hospital days and 30-day hospital readmissions, as well as to improve patient health and engagement. Program participants live independently in the Minneapolis-St. Paul area with community-based supportive care.

In 2013, the Courage Center merged with Sister Kenny Rehabilitation Institute to form Courage Kenny Rehabilitation Institute (CKRI) operated by the Allina Health System. Although there was some initial uncertainty about what this merger meant for the APCC, with strong leadership support, the clinic has continued to grow and now has a stable workforce.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on findings from NORC's consumer survey of program participants.

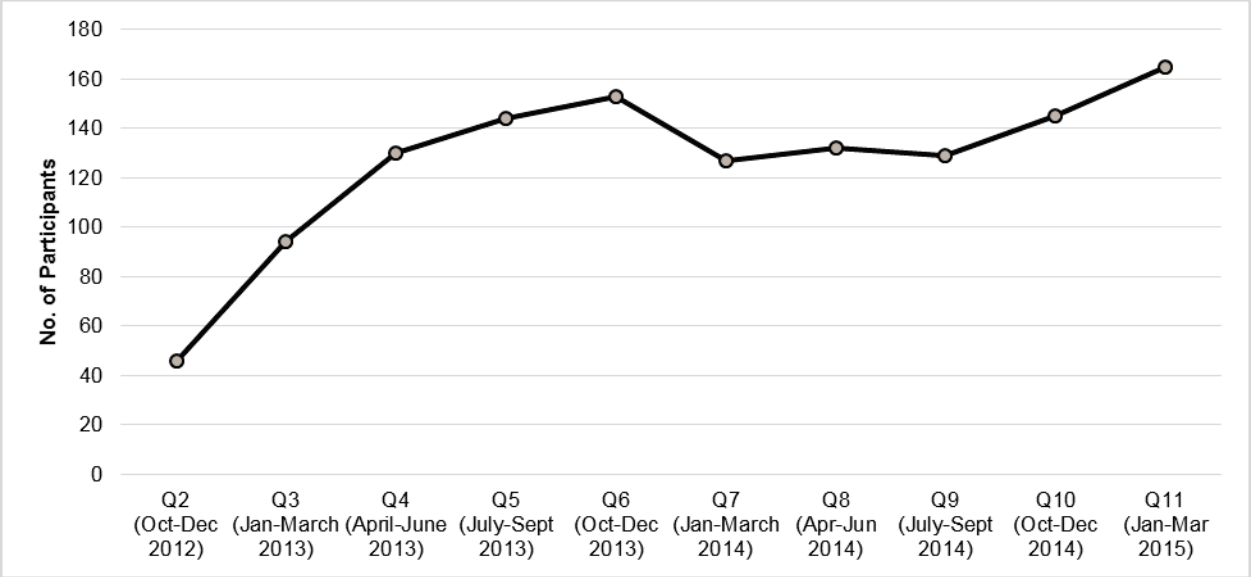
Overview of Awardee

CMMI Category for Awardee:	Rehabilitation Facilities/Providers
Funding Amount:	$1,767,667
Launch Date:	10/1/2012
State(s) Where Located:	Minnesota

Patients Targeted and Served

Self-reported data from Courage Kenny show participation by HCIA reporting quarter, as seen in Exhibit CKRI.1. Counts are included for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA grant, where the services are not supported by the grant). The data show a rapid increase in participants through Q6, a subsequent small decline, and then a steady increase since Q9. During the most recent quarter for which data are available (January 1 through March 31, 2015), Courage Kenny served 165 participants, both direct (42 participants) and indirect (123 participants). As of March 31, 2015, Courage Kenny's intervention had served 130 unique direct participants since program launch, comprising 94 percent of the total number projected to be served over the three years of the HCIA-funded program (138 participants).

Exhibit CKRI.1: Total Number of Courage Kenny Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Most participants are between the ages of 26 and 64 years (83 percent), with smaller numbers for young adults ages 19 through 25 years (10 percent) and those between the ages of 65 and 74 years (five percent).
- Gender: Three-fifths of participants are female (62 percent).
- Racial and Ethnic Identity: Most participants are identified as White (76 percent), and 17 percent as Black or African American.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit to CKRI (July 2014) and our first annual report (September 2014), CKRI has continued to successfully implement the adapted Health Care Home (medical home) model. CKRI has steadily increased their number of clients through various outreach efforts and hired new providers and specialists. In June 2015 NORC discussed improvement in communication and health IT and CKRI's plans to sustain the intervention.

Notable updates in our understanding of the CKRI intervention are as follows:

Communications and Health IT. CKRI is looking into new ways to use telemedicine. When new clients come into the program, CKRI offers to set up the equipment right away as an option to use after hospital visits, even if the client does not initially need it. CCs have been using it for developing care plans and education. While the technology is antiquated and cumbersome to get up and running, requiring both a volunteer and a scheduler, it has proved useful and CKRI is looking into enhancing the technology so that providers can obtain more clinical information remotely.

A second important development, CKRI recently implemented the Allina system EHR (Epic) and is holding weekly meetings on how to integrate information originating from different sources in the EHR.

Previously CKRI had struggled to maintain adequate documentation since patients are seen in multiple spaces, so this new tool is seen as a great improvement.

Patient and Caregiver Engagement. Patient engagement takes place as part of care coordination as well as more formally through home-based, weekly Independent Living Skills coaching delivered by specialists based at a partner community agency, and through participation in a six-week chronic disease self-management class (Health Living) taught by a Care Coordinator and a trained peer who is also a client of the ACPC.

The Chronic Disease Self-Management Program (CDSMP) is available from a Minnesota Department of Health license of the Stanford University model, but has been adapted to the target population, especially for the active living section for patients with mobility limitations. CDSMP teaches self-management skills such as communication, nutrition, appropriate exercise, decision making, techniques to cope with frustration or fatigue, and evaluating new medical treatments (Stanford Patient Education Research Center). While the course is facilitated by a registered nurse, the program is organized to be collaborative and participatory, so that patients are able to be advocates for themselves and their own care. Participants spoke to the lessons learned from peers as a major benefit of the program (Courage Kenny 2014 site visit). A major challenge in enrollment and completion of the CDSM has been poor winter weather in Minneapolis, which exacerbates the significant barriers to transportation that patients already face. CKRI reported that, "patients who are able to communicate verbally, are motivated, determined and ready to make a change, are not medically fragile (in hospital frequently, very complex medically), are the most likely to succeed in the CDSMP" (CKRI Quarter 10 Narrative).

Fidelity, Adaptability, and Self-Monitoring. As noted above, the merger with Allina provided a tumultuous start to the intervention, affecting staff retention, enrollment, and patient perception of instability and uncertainty. Through leadership and team commitment, however, CKRI weathered the internal merger and emerged stronger for it. For example, CKRI used the hiatus in new enrollments to revise their enrollment plan and target patients that more closely matched their expertise and whom they felt more prepared to serve. CKRI has continued to grow and adapt to meet the needs of their clients. For example, the care team includes a physician or nurse practitioner and a registered nurse, and may include an independent living specialist, social worker, or specialists. The awardee has changed the team structure to assign one RN to one provider to strengthen the working relationship and communication.

CKRI produces quarterly quality reports that track the demographics of enrollees such as poverty level and insurance coverage, as well as outcomes such as number of health days, patient activation, and depression. The care team closely reviews the incoming data so that changes can be made quickly.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We have requested Medicaid data from the Minnesota Department of Human Services, and we plan to present results from an analysis of these data in a future NORC report to CMMI. This report presents findings from our survey of consumer and caregiver experience.

Survey of Consumer and Caregiver Experience

NORC developed a short patient satisfaction survey for APCC participants to gauge their satisfaction with the program and its providers, and to collect self-reported health outcomes from this intervention's participants. The telephone survey was fielded between November 2014 and February 2015 with 52 percent of the patient population identified by CKRI responding.

Patient Satisfaction. Most respondents were satisfied with their doctor or nurse practitioner (52 percent were very satisfied, 29 percent were satisfied). Though some respondents suggested ways in which the program could improve, respondents reported being very satisfied with the services and assistance provided by their care coordinators. Through our analysis, we identify three overall themes in the CKRI participant responses:

- *Accessible Care.* Most participants (88 percent) report getting the help they needed at the time they needed it. Participants note that care coordinators were essential to connecting them to services they needed to manage their care.
- *Supportive Care.* Most participants describe the CKRI providers and care coordinators as considerate, helpful, and compassionate. Several participants state that bringing together and managing the different aspects of their care was the most important thing that their care coordinator did to help them.
- *Effective Care*. Almost all respondents state that the care they received at least partially improved their health (91 percent) and most relate that the care they received helped them avoid medical emergencies (71 percent). Respondents also report that they had fewer problems obtaining the medications they needed after they began participating in the HCIA intervention.

Areas for Improvement. Survey respondents suggested three general areas in which the awardee might consider improvement: 1) addressing what some believe is a high cost of care at CKRI; 2) adding more medical services on-site at CKRI, including X-rays and ultrasounds, holistic medicine, or psychiatry services[79]; and 3) improving coordination with non-CKRI providers and/or computerized medical records.

Summary

Consumer and Caregiver Experience Survey. Our review of CKRI's survey data indicates that the respondents are very satisfied with the CKRI program, including the Independent Living Skills, telemedicine, and Chronic Disease Self-Management programs. Overall, the consumer experience survey results support the conclusion that the programs at CKRI result in high quality care and improved health among participants. In future reports to CMMI, we will present more comprehensive findings and analysis of the survey data and will present results from the claims-based analyses of MN Department of Human Services data.

Sustaining and Scaling the Advanced Primary Care Clinic. CKRI received a 12-month no-cost extension and is continuing to provide RN care coordination, in-home support services (Independent

[79] The awardee has informed NORC evaluators that on-site psychiatry services are available at CKRI.

Living Skills), telehealth (may modify form), and the Chronic Disease Self-Management Program through 2015. The program is actively seeking funding through Medicare, Medicaid, and commercial insurance, as well as Courage Kenny Foundation support. CKRI is requesting per member per month care coordination payments from commercial payers who cover both Medicaid managed care and commercial populations to underwrite the innovation until the transition from FFS to risk-based contracts is complete. Currently CKRI is participating in the state's Integrated Health Partnership (IHP) Medicaid shared savings demonstration as part of Minnesota's State Innovation Model reform.

References

Maximum Health at Minimal Cost: A Community-Based Medical Model for the Non-Elderly Disabled. Courage Center; Minnesota Department of Human Services, 2012.

Courage Kenny Advanced Primary Care Clinic Health Care Home Telemedicine Volunteer Training Program: Courage Kenny Rehabilitation Institute, 2013.

"Q5 Supplemental Document." Courage Kenny Rehabilitation Institute, 2013.

"CG CAHPS Allina Version." 1-2: Allina Health, 2014.

Time Study Summary. Courage Kenny Rehabilitation Institute, 2014.

11qr Quarterly Awardee Performance Report: Courage Kenny Rehabilitation Institute. The Lewin Group, 2015.

Q11 HCIA Narrative Progress Report: Courage Kenny Rehabilitation Institute. Courage Kenny Rehabilitation Institute, 2015.

Judith H. Hibbard, Jessica Greene and Valerie Overton. "Patients with Lower Activation Associated with Higher Costs; Delivery Systems Should Know Their Patients' 'Scores'." *Health Affairs* 32, no. 2 (2013): 216-222.

Langel, Stephen J. "Pioneering New Ways to Engage the Disabled." *Health Affairs* 32, no. 2 (2013): 215.

Developmental Disabilities Health Services

This chapter updates NORC's evaluation of the Developmental Disabilities Health Services' (DDHS) Developmental Disabilities (DD) Health Home program. The DD Health Home model relies on care teams, consisting of nurse practitioners (NPs) and a physician, to provide integrated primary care, mental health services, and specialty medical care support for persons with intellectual and developmental disabilities (I/DD) who live in New Jersey and in the Bronx in New York. The goal is to provide integrated and comprehensive care and care management for patients, working alongside their pre-existing support system, to create continuity of care for this transient population and ease the burden on caregivers by providing conveniently located offices. DDHS leadership has been involved in care for people with I/DD for over a decade. HCIA funds have been used to establish new service sites in New Jersey and New York.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness, as well as findings from DDHS's survey of patient satisfaction.

Overview of Awardee

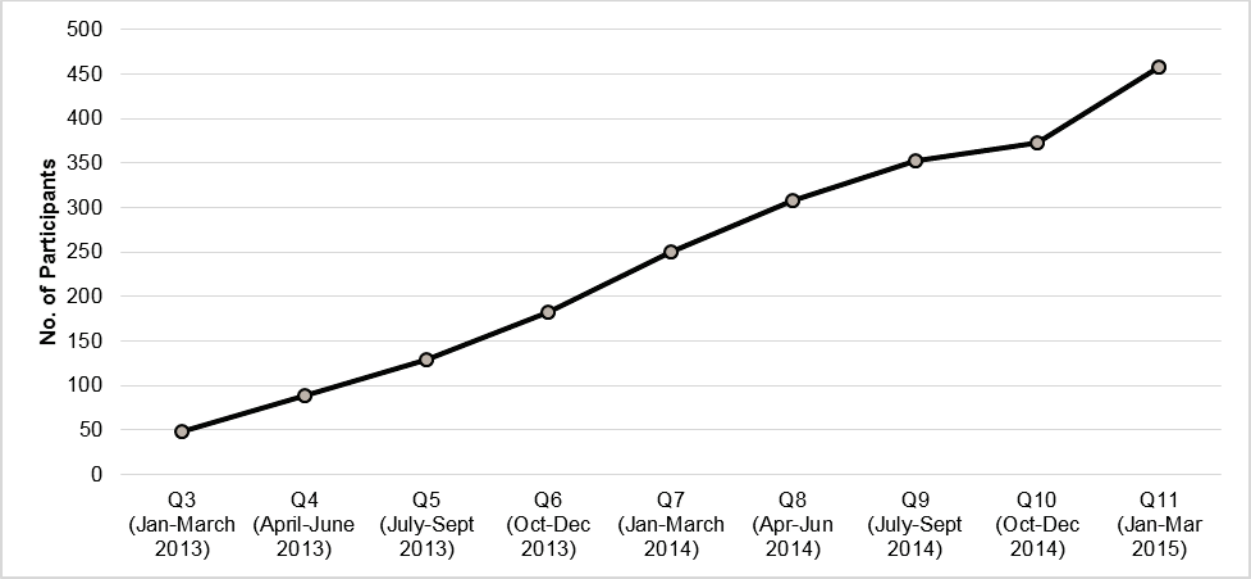
CMMI Category for Awardee:	Primary Care Clinics
Funding Amount:	$3,701,528
Launch Date:	1/15/2013
State(s) Where Located:	New Jersey, New York

Patients Targeted and Served

Self-reported data from DDHS provide enrollment by HCIA reporting quarter, as shown in Exhibit DDHS.1. The data show a steady increase over time through Q11. Counts are for participants who are considered to be served indirectly (by staff employed and trained under the HCIA award but whose services are not covered by the award) rather than directly (those whose services are covered by the HCIA award). During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 458 participants. As of March 31, 2015, the DDHS program had served a cumulative total of 2,192 patients[80] since program launch, greater than the number the awardee initially projected they would serve over the three years of the HCIA-funded program (777 participants).

[80] Calculated by NORC by summing quarterly counts of indirect participants.

Exhibit DDHS.1: Total Number of DDHS Participants, by HCIA Quarter



For the group of participants participating during the period from January 1 through March 31, 2015:

- Age Cohort: Most are adults ages 26 through 64 years (74 percent), with smaller proportions young adults ages 19 through 25 years (10 percent) and adults ages 65 through 74 (6 percent).
- Gender: More than half the participants are male (54 percent).
- Racial and Ethnic Identity: Over half of participants are identified as White (59 percent), 22 percent as Black or African American, and 17 percent Hispanic or Latino.

Update: Implementation Experience in the Third Year of Award

Since NORC's site visit to DDHS (April 2014) and our first annual report (September 2014), the program has continued to establish a presence in their market, expanding the care options available for their population. While the program continues to experience hurdles in establishing capitated contracts with Medicaid managed care plans as originally envisioned, it has made strides in creating alternate relationships and pathways to enrolling patients. Their relationship with Albert Einstein Medical College has become a viable sustainability avenue.

Notable updates in our understanding of the DDHS intervention are as follows:

Patient and Caregiver Engagement. Patient engagement for their target population stems from providers' patient-centered approach to care. Whenever possible, patients are given deference and consulted in developing their plan of care. Providers address the patient directly and respectfully, and include caregivers in the appointment to offer additional information and act as support for the patients. Providers plan for visits that are longer than most office consultations to give patients the extra time needed to explain their medical issues, express their opinions, and engage in teach-back conversation so patients leave understanding any medical decisions made during the visit. Due to the communication

barriers that many patients have, the longer time allows for a fuller understanding from the provider and patient perspective.

Caregiver engagement is particularly important for this population. Caregivers range from family, paid caretakers or counselors at group homes. Unfortunately, counselors at groups homes are often underpaid and the field experiences high turnover. DDHS providers include caregiver education in appointments and the general care environment to support caregiver activities, such as adherence to medication schedules, monitoring health habits, or providing transport. Given the awardee's prior experience with their target population, DDHS is able to anticipate caregiver needs and concerns with respect to medical appointments and care.

The success of DDHS patient engagement can in part be assessed through results of its patient satisfaction survey. Since program launch, DDHS has developed, validated, and fielded a patient satisfaction survey on a rolling basis. A shorter, 14-item pre-survey is provided to all patients at baseline, with a more comprehensive 32-item post-survey; both are administered in person, with patients and their caregivers in office waiting rooms. It is usually completed by caregivers. According to DDHS' analysis of survey results during 2013 and 2014 as part of its self-evaluation report, "Virtually all of the comparison items show significantly better ratings in the DD Health Home compared to patients' previous health care settings. Ratings of satisfaction with services were uniformly high; added, handwritten comments were overwhelmingly positive." (DDHS Satisfaction Surveys and Utilization/Cost Analysis Report 2013/2014, p. 13) More recent DDHS survey results, reflecting additional questions added by NORC, are presented later in this report.

Fidelity, Adaptability, and Self-Monitoring. DDHS has implemented its intervention steadily, with few changes in their care delivery model, but they have shown great flexibility and adaptability in their sustainability planning and response to market conditions. The awardee encountered contracting and reimbursement barriers in the beginning of their award. After an original health plan partner in New Jersey had a leadership change that resulted in the withdrawal of the capitated contract for DDHS services under development, DDHS leadership made new partnerships and connections around the state with an eye to future arrangements. The awardee accepted a fee-for-service contract, which was not in line with the original award model, but allowed the awardee to serve additional participants. The partnership with the New York-based hospital system and teaching college has provided many more opportunities for expansion and sustainability than originally imagined.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of time series analyses for Medicare fee-for-service (FFS) beneficiaries enrolled in DD Health Home from January 15, 2013, through September 30, 2014. Medicare FFS beneficiaries comprise 50 percent of the awardee's targeted patients. We find that DD Health Home program participants experience increased hospitalizations and 30-day readmissions, increased total cost of care rates, and decreased ACS hospitalizations and ED visits in the post-

intervention period compared to the pre-intervention period. None of these results, however, are statistically significant.

In addition, we present initial findings from NORC's analysis of data shared by DDHS from its patient satisfaction survey, which includes questions added at our request. We find that patients report overall satisfaction and health improvement with the DD Health Home model.

Claims-Based Analysis

Measures. Findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total annual cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

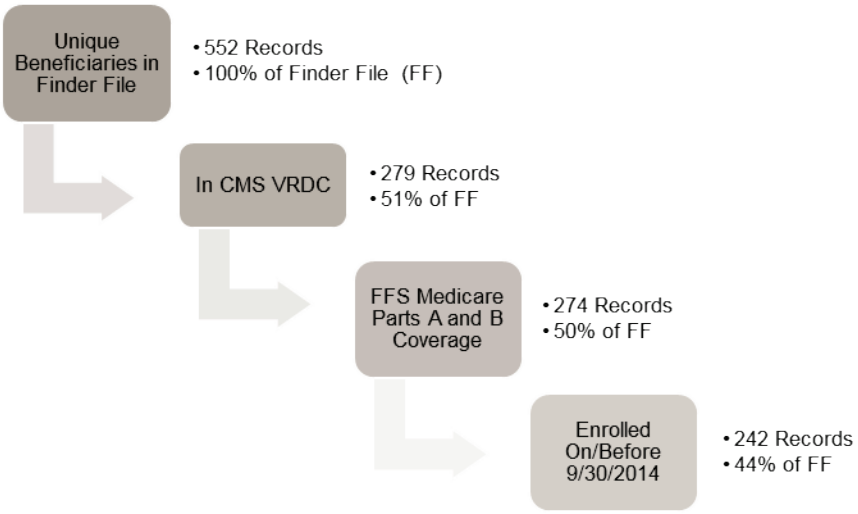
Research Question. For each measure, what is the change in outcome for participants after enrollment in the DD Health Home program?

Analytic Approach. We specify and employ a time series model, comparing the experiences of participants in the DD Health Home program between the pre- and post-intervention implementation periods.

Finder File and Creation of Analytic Sample. DDHS provided a finder file that lists its program participants and their enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[81] As shown in Exhibit DDHS.2, the finder file identified 552 unique participants in the DD Health Home program. We matched 279 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC), of which 274 were FFS Medicare beneficiaries during the month of program enrollment. Application of the September 30, 2014, enrollment cut-off date yields a sample of 242 participants for the DD Health Home program in the post-intervention period.

[81] Medicare claims are available through December 31, 2014, for the analysis in this report. We use September 30, 2014, as the cut-off date to account for the 90-day claims runoff.

Exhibit DDHS.2: FFS Medicare Beneficiaries Identified Through DDHS Finder File



Analysis

Model. To answer these questions, we employ population-averaged logistic models with binary outcome variables for utilization (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we use a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta \text{Participant}_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the t^{th} *Time* vector. *Time* is specified as an indicator variable denoting the post-intervention period; $\boldsymbol{\alpha}$ is a vector of effects corresponding to the relevant time variables in the models; *Participant* is a vector of participant demographic and clinical variables; and $\boldsymbol{\beta}$ is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, the primary outcome of interest is the difference between $\boldsymbol{\alpha}$ for the post-intervention period and $\boldsymbol{\alpha}$ for the pre-intervention period.

Results

Descriptive Characteristics. Exhibit DDHS.3 displays the descriptive characteristics of DD Health Home Medicare FFS beneficiaries with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment. Of the 242 participants in our analytic file enrolled for at least one quarter in DD Health Home, the average number of quarters of enrollment is 4.5, with the longest enrollment being eight quarters. Because too few program participants were enrolled for eight continuous quarters (n=11) to observe meaningful trends, we do not include observations for an eighth quarter in the analysis. Just over half of the participants are male (58 percent) and three-quarters are White (76 percent). Almost all are dually enrolled (98 percent) and gained Medicare coverage through disability (99 percent).

Exhibit DDHS.3: Descriptive Characteristics for the DDHS Program Enrollees

Variable	Value
Number of Persons	242
Mean Number of Quarters Enrolled [Range]	4.5 [2 - 8]
Gender % (N)	
Female	41.7 (101)
Age Group % (N)	
<30 years old	7.9 (19)
30-39 years old	17.4 (42)
40-49 years old	19.8 (48)
50-59 years old	32.6 (79)
≥60 years old	22.3 (54)
Race/Ethnicity % (N)	
White	76.4 (185)
Black	14.5 (35)
Asian	1.7 (4)
Hispanic	3.7 (9)
Other	3.7 (9)
Dual Eligibility % (N)	
Dually Enrolled	97.9 (237)
Coverage Reason % (N)	
Age	1.2 (3)
Disability	98.8 (239)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	1.0 (0.9)
Mean Count of HCCs (Standard Deviation)	1.6 (1.8)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Annual Medicare Cost (SD)	$ 6,425 ($11,336)
Hospitalizations per 1,000 (SD)	231.4 (666.4)
ACS Hospitalizations per 1,000 (SD)	24.8 (155.8)
30-Day Readmissions per 1,000 (SD)	33.1 (255.5)
ED Visits per 1,000 (SD)	1095.0 (1929.0)

Time Series Analysis. We display and discuss the differences in cost and utilization for the DD Health Home program below; see Exhibit DDHS.4 below.[82] The results for utilization outcomes (hospitalizations, ACS hospitalizations, 30-day readmissions, and ED visits) show the adjusted marginal difference for the post-intervention period (from the population-averaged logistic models) for the number of participants with the outcome, and the result shown for total cost of care is the adjusted marginal difference for the post-intervention period (from the gamma distribution GEE model).

The model-based estimates indicate the following, relative to the pre-intervention period:

- Utilization Measures: We observe essentially no change in hospitalizations (an increased rate of 0.2 per 1,000 beneficiaries), a non-significant increase in 30-day readmissions of 9.6 per 1,000 beneficiaries, and a non-significant decrease in ED visits of 7.1 per 1,000 beneficiaries in the

[82] Adjustment factors include post-intervention indicator, age category, race/ethnicity, gender, extent of FFS coverage, dual eligibility indicator, HCC score, and disability indicator.

post-intervention period. This is an increase of two 30-day readmissions and a decrease of two ED visits in this small population during the post-intervention period.

- Cost Measures: We observe a non-significant increase of $339 in total annual cost of care per beneficiary in the post-intervention period.
- Quality of Care Measures: We observe a non-significant decrease in ACS hospitalizations of two per 1,000 beneficiaries in the post-intervention period. This change in utilization amounts to a decrease of 0.5 ACS hospitalizations in the small population during the post-intervention period.

Exhibit DDHS.4: Utilization and Cost Differences for DD Home Health Program Participants Before and After Implementation

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	0.2 [-14.9, 15.3]
ED Visits (Likelihood per 1,000 Beneficiaries)	-7.1 [-34.0, 19.9]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	9.6 [-4.9, 24.0]
Total Annual Cost of Care per Beneficiary ($)	$339 [$-82, $761]
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	-1.9 [-12.4, 8.5]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. Key limitations of this analysis are that 1) without Medicaid data, only 50 percent of program participants are included in the analysis—those enrolled in both Medicare and Medicaid—likely biasing the results, and 2) we do not have a comparison group for the awardee and thus cannot compare these results to a similar population that does not receive the DD Health Home intervention. In subsequent analyses, we plan to present results for a comparison group consisting of matched Medicaid beneficiaries.

Survey of Consumer Experience

In September 2014, DDHS incorporated three NORC-developed items into their existing, validated, patient satisfaction post-survey. After reviewing DDHS' survey instrument and discussing NORC's survey goals within the scope of existing survey efforts, we agreed with the awardee that the DDHS patient satisfaction survey was comprehensive, with the addition of the following questions:

- Since coming to DDHS, do you feel like you can take better care of your own health? Y/N
- Since coming to DDHS, have you had fewer problems with your medication? Y/N
- In your opinion, do your health care providers at DDHS work together to solve your health problems? Y/N

DDHS has continued to collect patient satisfaction data quarterly, adding the NORC items to their post-survey. At the end of July 2015, NORC received full survey data from DDHS, including data for NORC's new questions, for surveys administered from September 2014 through June 2015. We report limited

survey findings in this quarterly report, focusing primarily on respondent demographics and background information.

Results

The findings below represent data collected on 182 survey respondents who completed the DDHS patient satisfaction post-survey; see Exhibit DDHS.5 for a summary. Given that the program model is designed for persons with intellectual and developmental disabilities, most respondents (78 percent) were unable to complete the survey independently and received assistance via a proxy. Survey results indicate that most respondents (69 percent) are between the ages of 30 and 64 years, with another 9 percent between 65 and 74 years, a slightly older representation than are the enrolled patients described above; the mean age of survey respondents is 50 years. Similar to the enrolled population, however, the survey sample includes more male patients (53 percent) than female patients (40 percent). The profile of proxy respondents is slightly different, with a mean age of 44 years and more females completing the survey than males (80 percent v. 16 percent).

Exhibit DDHS.5: Demographic Characteristics of DDHS Survey Respondents[1]

Variable	Value
Survey Respondent % (N)	
Patient	22.0 (40)
Proxy Respondent	78.0 (142)
Patient Gender % (N)	
Male	53.3 (97)
Female	40.1 (73)
Patient Age % (N)	
< 30 years	9.4 (15)
30-54 years	53.8 (86)
55-64 years	24.4 (39)
65-74 years	10.6 (17)
≥ 75 years	1.9 (3)
Proxy Gender[2] % (N)	
Male	16.2 (23)
Female	80.1 (114)
Proxy Age[2] % (N)	
< 30 years	26.5 (36)
30-54 years	50 (68)
55-64 years	14.7 (20)
65-74 years	5.89 (8)
≥ 75 years	2.94 (4)
Proxy Relationship to Patient[2] % (N)	
Mother	18.3 (26)
Father	4.2 (6)
Other/Relative	0.7 (1)
Paid Staff Member	70.4 (100)

NOTES: [1]Records with demographic data of interest missing/undefined in DDHS file are excluded from counts/percentages.
[2]Based on 142 surveys completed by proxy respondents.

While the DD Home Health model integrates both mental health and neurological care with primary care, most respondents (79 percent) report using the program for a single purpose; see Exhibit DDHS.6. Ninety-two (92) percent of respondents receive regular health care and routine medical services and 20 percent receive mental health services. Very few respondents report utilizing the care coordination or neurological services available (7 percent and 2 percent, respectively). Roughly two-thirds of respondents were referred to the program by staff at a provider agency/group home or through the Division of Developmental Disabilities. A smaller portion of respondents (25 percent) were referred by a health care provider, friend or relative, or noted that they were self-referred.

Exhibit DDHS.6: DDHS Service Utilization and Referral Source

Variable	Value
Service % (N)	
Regular Health Care and Routine Medical Services	91.8 (167)
Mental Health Services	20.3 (37)
Care Coordination Services	7.1 (13)
Neurological Services (Seizure Management)	2.8 (5)
Number of Services Received % (N)	
1	78.6 (143)
2	17.6 (32)
3	2.8 (5)
4	0.6 (1)
Referral Type % (N)	
Self-Referral	12.6 (23)
Friend or Relative	3.3 (6)
Physician or Other Health Care Worker	8.8 (16)
Referred by Staff Member of a Provider Agency or Group Home Staff	46.2 (84)
Referred by NJ/DDD* or NY/OMRDD**	20.9 (38)

NOTE: *New Jersey Division of Developmental Disabilities. **New York Office of Mental Retardation and Developmental Disabilities, now known as the Office for People with Developmental Disabilities.

Overwhelmingly, patients report improvements in their care and satisfaction with the health home model, as captured in responses to the three NORC questions added to DDHS's survey; see Exhibit DDHS.7. Nearly all respondents (99 percent) agree that health care providers work cooperatively to solve their health issues, helping to integrate care. The positive reports of care integration support the intervention's aim to improve individual care needs and reduce emergency room visits and lower out-of-home placement and institutionalization. Not only do respondents report high levels of care integration, a majority also report feeling more confident in managing their own health (85 percent) and having fewer problems with their medication (90 percent).

Exhibit DDHS.7: Survey Responses, NORC Items

Variable	% Responded Yes (N)
Since coming to DDHA do you feel like you can take better care of your own health?[1]	85.2 (155)
Since coming to DDHA have you had fewer problems with your medication?[2]	89.6 (163)
In your opinion, do your health care providers at DDHA work together to solve your health problems?	98.9 (180)

NOTES: [1]Seven records with null response and one record with undefined response in DDHS file. [2]Five records with null response.

Summary

Claims-based Analysis. Our quantitative analysis of the DD Health Home program shows non-significant increases in hospitalizations, 30-day readmissions, and total annual cost of care for participants in the post-intervention period compared to the pre-intervention period. In addition, there are non-significant decreases in ACS hospitalizations and ED visits.

DDHS Patient Satisfaction Survey. We also find in our initial review of a subset of DDHS-collected survey data that the results are in line with patient satisfaction on other DDHS survey questions, and that patients and proxy respondents are very satisfied with DDHS services. Service integration to improve individual care experience and health is seen to benefit respondents, based on reported satisfaction and perception of health in the full survey data. In future reports, we plan to analyze survey findings along the continuum of treatment and support services, along with our additional items, for any differences by sub-group (patient v. proxy respondent), number of DDHS services used, or type of DDHS service sought (e.g. regular health care versus mental health services). We will further explore the survey methodology used in DDHS's patient satisfaction post-survey.

Sustaining and Scaling the Developmental Disabilities Health Home. Moving forward, DDHS leadership plans to sustain their integrated and comprehensive primary care model as service sites at Albert Einstein Medical Center (AEMC) and Montefiore Medical Center. Program leadership has worked within the grant to integrate care for persons with intellectual and developmental disabilities into the Children's Evaluation and Rehabilitation Center (CERC), which has produced positive and promising relationships with AEMC leadership. The awardee has not reported or confirmed sustainability plans for their New Jersey sites, remarking that the options for scaling and replication will depend on establishing capitated arrangements with payers.

References

DDHA Patient Satisfaction: Description of the Survey Form. Developmental Disabilities Health Services 2013.

Project Description and Measurement and Evaluiation Overview: Expanding and Testing a Nurse Practitioner-Led Health Home Model for Individuals with Developmental Disabilities. Developmental Disabilities Health Services 2013.

Developmental Disabilities Health Services: Satisfaction Surveys and Utilization/Cost Analysis Report. Developmental Disabilities Health Services 2014.

11QR Quarterly Awardee Performance Report: Developmental Disabilities Health Services. The Lewin Group, 2015.

Q10 Supplemental Documentation: Developmental Disabilities Health Services. Developmental Disabilities Health Services, 2015.

Q11 HCIA Narrative Progress Report: Developmental Disabilities Health Services. Developmental Disabilities Health Services, 2015.

Johns Hopkins University

This chapter updates NORC's evaluation of the Johns Hopkins University Community Health Partnership (J-CHiP) program. There are two components of the J-CHiP intervention: a hospital and SNF post-acute intervention, and a clinic and community-based intervention. Both interventions focus on high-utilizing Medicaid and Medicare patients. J-CHiP's post-acute intervention provides care coordination services for Medicare and Medicaid patients discharged from two hospitals—the Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, in partnership with five skilled nursing facilities (SNFs). Major components of the post-acute intervention include daily multi-disciplinary rounding, a Meds for Home initiative, patient education, behavioral health and social work services, post-discharge home visits by Transition Guides for high-risk patients, and a Patient Access Line (PAL), which provides post-discharge phone check-ins by a dedicated Hopkins nurse. J-CHiP's community intervention provides care coordination and enhanced primary care services for high-risk Medicare and Medicaid residents of East Baltimore in partnership with eight community clinics staffed with a multi-disciplinary team. In addition to clinic-based CHWs, J-CHiP has enlisted two community organizations, Sisters Together and Reaching (STAR), which employs several Community Health Worker Case Managers (CHWCMS), and the Men and Families Center, to provide direct patient outreach and supportive services to targeted patients and neighborhoods. The work of these organizations is referred to as Tumaini (Hope) for Health ("Tumaini" is Swahili for "hope"). The Neighborhood Navigators (NNs) from the Men and Families Center are trained through J-CHiP (but are not required to have advanced degrees or specific certifications or licenses) to canvas their own neighborhoods, introduce available health services and resources to residents, connect patients with resources in the community, and provide social support on a block-by-block basis.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

Overview of Awardee

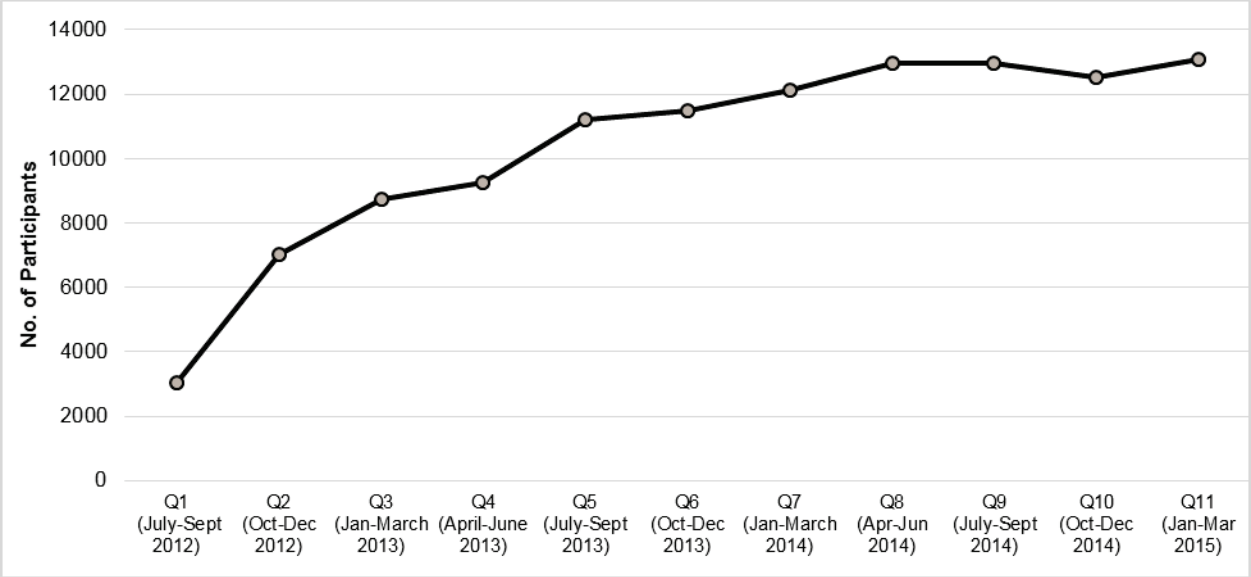
CMMI Category for Awardee:	Academic/University
Funding Amount:	$19,920,338
Launch Date:	7/1/2012
State(s) Where Located:	Maryland

Patients Targeted and Served

Self-reported data from Johns Hopkins indicates participation by HCIA reporting quarter, as shown in Exhibit JCHiP.1, for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA award but whose services are not directly funded by the award). The data show a steady increase over time, with a slight dip between Q9 and Q10. Based on corrected Q11 data submitted by J-CHiP, during the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 13,577 patients, both direct (12,729 participants) and indirect (848 participants). As of March 31, 2015, J-CHiP had served a cumulative total of 72,945 unique participants since program launch, comprising 95

percent of the total number projected to be served over the three years of the HCIA-funded program (75,965 participants). The awardee's self-reported counts are not distinguished by intervention component.

Exhibit J-CHiP.1: Total Number of J-CHiP Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: 62 percent of participants are adults between the ages of 26 and 64, while 16 percent are between the ages of 65 and 74, and an additional 16 percent are age 75 and up. Five percent are young adults, ages 19 through 25 years.
- Gender: There are slightly more female (52 percent) than male participants.
- Racial and Ethnic Identity: 52 percent of participants are identified as White, 44 percent as Black or African American, two percent as Hispanic or Latino, and one percent as Asian.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit to J-CHiP (March 2014) and our first annual report (September 2014), J-CHiP has continued to provide its PAC intervention at Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center (JHBMC), engage a growing number of residents in East Baltimore through community outreach events and NNs and CHWs, and introduce additional clinical protocols at partner SNFs. On NORC's second site visit (March 2015), we interviewed staff at JHBMC, observed multidisciplinary rounds at JHBMC, and interviewed NNs and CHWs working in the community arm of J-CHiP's intervention. We also visited a skilled nursing facility and interviewed a number of staff participating in the SNF intervention, and met with J-CHiP's evaluation team. HCIA support for J-CHiP's PAC intervention ended June 30, 2015. The awardee received a no-cost extension for J-CHiP's clinic and community-based services, which will underwrite the operations of these initiatives through the first months of 2016, approximately.

Communications and Health IT. J-CHiP's post-acute intervention arm uses daily multidisciplinary rounding, which involves a hospitalist, the case manager, social worker, transition guide, home care coordinator, pharmacist, and pharmacy assistant, among other staff, to provide all team members with status updates for each patient, plan for the next steps in care, and develop discharge instructions. Staff are also encouraged to re-group after the rounds to go over patient needs and discuss plans of care in greater detail. The five partner SNFs and Johns Hopkins staff also use monthly collaborative meeting to discuss successes and challenges in transitions among sites of care, and ways to improve coordination and communication among staff.

The J-CHiP program also uses several health IT components to track and coordinate care across team members. The Epic EHR continues to be rolled out to more Johns Hopkins sites of care to facilitate care coordination and the sharing of information across team members, and CHWs working in the community can now access Epic records to follow-up on a patients' appointments and status. Staff also use Meditech, an EHR, to prompt them on teaching aspects of a patients' disease and to document what was taught. The J-CHiP team also use two program management related softwares: REDCap, a common web-based platform, and JCARE, which is a home-grown case management software built on a Salesforce platform. REDCap is used by inpatient transitions guides and those working with transitions to SNFs to help team members at Johns Hopkins and the five collaborating SNFS coordinate and manage patient transition and JCARE is used by CHWs in the community to record case notes.

Patient and Caregiver Engagement. The patient engagement aspect of the J-CHiP intervention relies on a team-based approach to motivate, educate, and support self-management of health conditions in a medically complex and disadvantaged population in East Baltimore. Patient education, patient self-management, and health literacy are key features of the intervention and these activities are a large part of the overall intervention strategy. These activities are most notably delivered in the form of disease self-management education and medication consultation for hospitalized patients, with transitional and follow-up services provided during and after discharge. As mentioned above, J-CHiP's transition and follow-up services include transition guides for patients who need more intensive supports and guidance after discharge, and PAL nurses, who call patients after discharge, are available for other patients not receiving transition guide or home care services. NNs and CHWs in J-CHiP's community intervention are especially focused on learning about individual community members' needs and concerns, and developing a personal rapport that allows the community worker to assist residents to access and use appropriate health services. NNs and CHWs engage with patients sometimes daily, providing encouragement, advice, referrals to community services, help scheduling appointments, meeting them at the appointment if need be and following-up after the appointment.

Fidelity, Adaptability, and Self-Monitoring. J-CHiP has been successful in making intervention modifications to improve the program's success. For example, the Transition Guides originally called patients after hospital discharge to schedule a follow-up home visit, but after experiencing a lower rate of completed follow-ups, these staff members met with patients before discharge to introduce themselves and build rapport, increasing the percentage of patients willing to participate in a follow-up home visit Staff also moved patient education to earlier in the hospital stay, which allows multiple staff members an opportunity to reinforce disease self-management concepts over a longer period of time. The activities of

the Tumaini for Health component of J-CHiP have expanded in the third year of the HCIA award to include community lunches and health education sessions, in addition to individual outreach and care management. J-CHiP has a strong internal evaluation team who have helped guide and improve the intervention components. This internal evaluation team has conducted cost and utilization analyses of intervention patients and produced internal reports helpful to project and administrative leaders at Johns Hopkins.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. As mentioned above, the J-CHiP post-acute program aims to coordinate in-hospital and post-discharge services, while its community program coordinates clinic-based primary care with community outreach services. The two programs enhance the quality of chronic disease management across settings in the continuum of care. We present results for both the hospital/post-acute intervention component of the J-CHiP program and for the clinic community-based component of J-CHiP, including:

- difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiary-episodes in the hospital arm of the J-CHiP intervention from April 1, 2013, through September 30, 2014, relative to beneficiary-episodes from comparison hospitals.
- a time-series analysis for J-CHiP's community arm, for which we have not yet constructed a comparison group.

Reflecting the data available to us at this time, our analysis is limited to program participants with FFS Medicare coverage, who account for approximately one-third (31 percent) of J-CHiP's targeted participants.[83]

Measures. For the difference-in-differences analysis, findings are presented for six measures:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes
- 90-day total cost of care per beneficiary-episode
- 7-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes
- 30-day PV follow-up per 1,000 beneficiary-episodes

[83] Based on data from HCIA Q11 Awardee Performance Report.

For the time-series analysis, findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- 90-day ED visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total annual Medicare cost per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

Research Questions. For each measure, we address the following research questions:

- For the hospital arm of the J-CHiP program, what is the difference in outcome between FFS Medicare beneficiary-episodes seen at Johns Hopkins University (JHU) hospitals and those in seen in comparison hospitals, after implementation of J-CHiP, adjusting for differences in outcomes at baseline and risk factors across both populations?
- For the community arm of the J-CHiP program, what is the change in outcome for participants after enrollment in J-CHiP?

Analytic Approach. We present findings from two sets of analyses:

- A DID analysis to compare changes in utilization and cost between FFS Medicare beneficiary-episodes in J-CHiP's intervention and those in the comparison group, between the pre-84 and post- intervention implementation periods.[85]
- A time series analysis for Medicare FFS beneficiaries enrolled for 8 quarters before and after implementation of the J-CHiP program (enrolled on between February 01, 2013, and September 30, 2014).

Finder File and Creation of Analytic Sample. For the hospital arm of the J-CHiP intervention, JHU provided NORC with a finder file of program participants and their enrollment dates, enabling us to pull Medicare claims for FFS beneficiary-episodes and calculate outcome measures for this subset of participants.[86] The finder file identifies whether beneficiary-episodes took place in the post-intervention period (after the full implementation of the HCIA award on April 1, 2013), or during an intervention

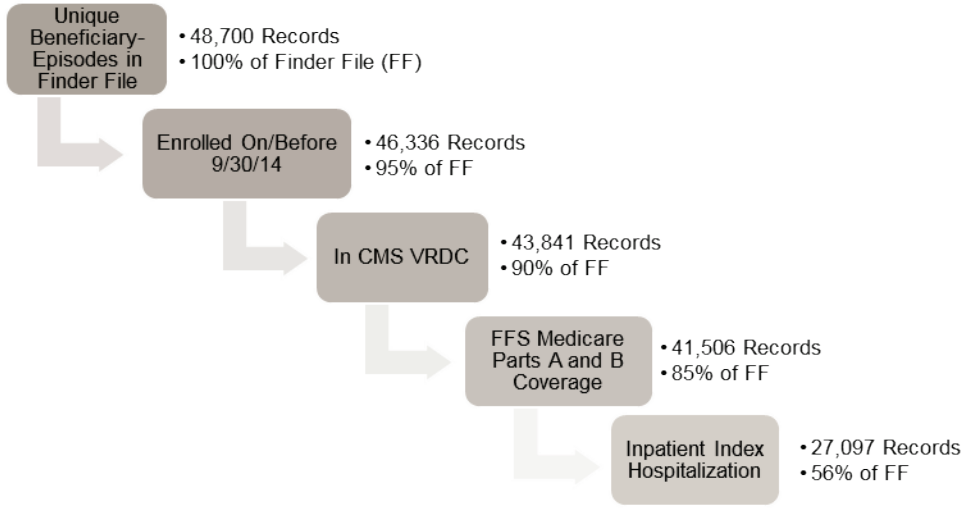
[84] J-CHiP implemented the hospital program in specific units in Johns Hopkins Hospital and hospital-wide in Johns Hopkins Bayview Medical Center. Our current analysis includes all pre-implementation episodes from the two hospitals, since we identify beneficiary-episodes discharged from the specific units in Johns Hopkins Hospital during the pre-intervention period from claims. For forthcoming reports, we expect that J-CHiP will provide us with a finder-file, which will enable us to identify pre-implementation episodes from specific units in the Johns Hopkins Hospital where the J-CHiP program was eventually implemented.

[85] We exclude beneficiary-episodes during a ramp-up period of the J-CHiP hospital/post-acute intervention (July 1, 2012, through March 31, 2013) from our analysis.

[86] We use beneficiary-episodes as the unit of analysis because the awardee program uses each hospital admission as an opportunity for quality improvement, and the finder file includes multiple admissions (episodes) for some beneficiaries.

ramp-up period (after the start of the HCIA award on July 1, 2012, through March 31, 2013).[87] As shown in Exhibit JCHiP.2, the finder file identifies 48,700 unique beneficiary-episodes in the J-CHiP program.[88] With these records, we are able to match 43,841 to Medicare beneficiary identifiers; 41,506 of these participants are Medicare FFS beneficiaries during the month of program enrollment. Restricting to inpatient admissions, we identify 27,097 discharges among this group, with 6,562 beneficiary-episodes in the ramp-up period and 20,535 beneficiary-episodes in the post-intervention period, as index hospitalizations to include in the final analytic sample.

Exhibit J-CHiP.2: FFS Medicare Beneficiary-Episodes Identified Through JHU Finder File, Hospital Arm

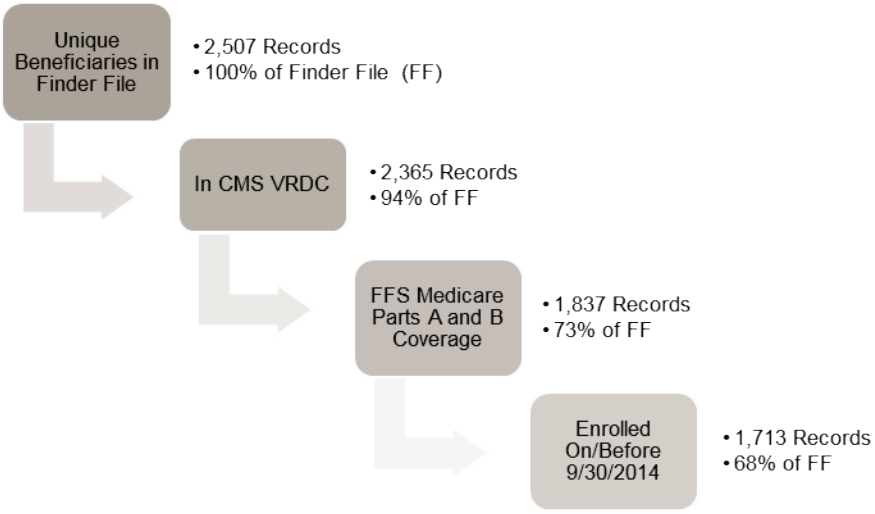


For the community arm of the J-CHiP intervention, we obtained a finder file for participants enrolled in J-CHiP's clinic/community arm. Of the 2,507 unique patient records, we identify 2,365 unique Medicare beneficiaries from Medicare claims on the VRDC and 1,837 participants who were FFS and had Parts A and B coverage, as summarized in Exhibit JCHiP.3 below. Application of the September 30, 2014, enrollment cut-off date yields a sample of 1,713 participants for the J-CHiP, community arm.

[87] The post-intervention period is the time period after which the HCIA intervention was fully implemented by the awardee. The ramp-up period is the time period between the start of the HCIA award and the post-intervention period where the awardee was in the midst of fully implementing the HCIA program. The pre-intervention period is the time period prior to the start of the HCIA award.

[88] We used Medicare claims through December 31, 2014, for the analysis in this report. We included beneficiary-episodes discharged on or before September 30, 2014 in our analyses, to allow for a beneficiary-episode length of 90-days.

Exhibit J-CHiP.3: FFS Medicare Beneficiaries Identified Through JHU Finder File, Community Arm



Analysis 1: Hospital Arm

Comparison Group. We use Medicare claims to create internal and external comparison groups for J-CHiP's hospital arm, including identification of episodes for both the pre- and post-intervention periods. While J-CHiP's finder file allows us to identify beneficiary-episodes in the post-intervention period, we use claims-based rules[89] to identify Medicare beneficiary-episodes discharged from Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center in the pre-intervention period.[90] We also use claims-based rules to identify an external comparison group comprising of beneficiary-episodes discharged from comparison hospitals[91] in geographic proximity and similar to the two J-CHiP hospitals, during the pre- and post-implementation periods. For more details on the methods for comparison group selection, refer to Appendix C.

For the hospital arm of the J-CHiP intervention, we use propensity score models to estimate the relative probability of a beneficiary-episode being in the J-CHiP post-treatment group and calculate relative weights for beneficiary-episodes in the J-CHiP pre-treatment, pre-comparison, and post-comparison groups. For more details on propensity score models and relative weighting, see Appendix C. We

[89] J-CHiP implemented the hospital program in specific units in Johns Hopkins Hospital and throughout Johns Hopkins Bayview Medical Center. Since we are unable to use claims-based rules to identify beneficiary-episodes discharged from the specific units in Johns Hopkins Hospital during the pre-intervention period, we use all Medicare beneficiary-episodes from Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center which meet the inclusion criteria, as part of the pre-intervention group.

The J-CHiP program excludes from their targeted population hospitalizations for clinical trials and solid organ/bone marrow transplants. We exclude such beneficiary episodes from the pre-intervention group as well as the pre- and post-comparison groups.

[90] We only include beneficiaries that had a short-term inpatient stay at the treatment/comparison hospitals and who were discharged alive. Beneficiaries admitted to the hospitals and transferred to another inpatient facility are excluded from our analysis.

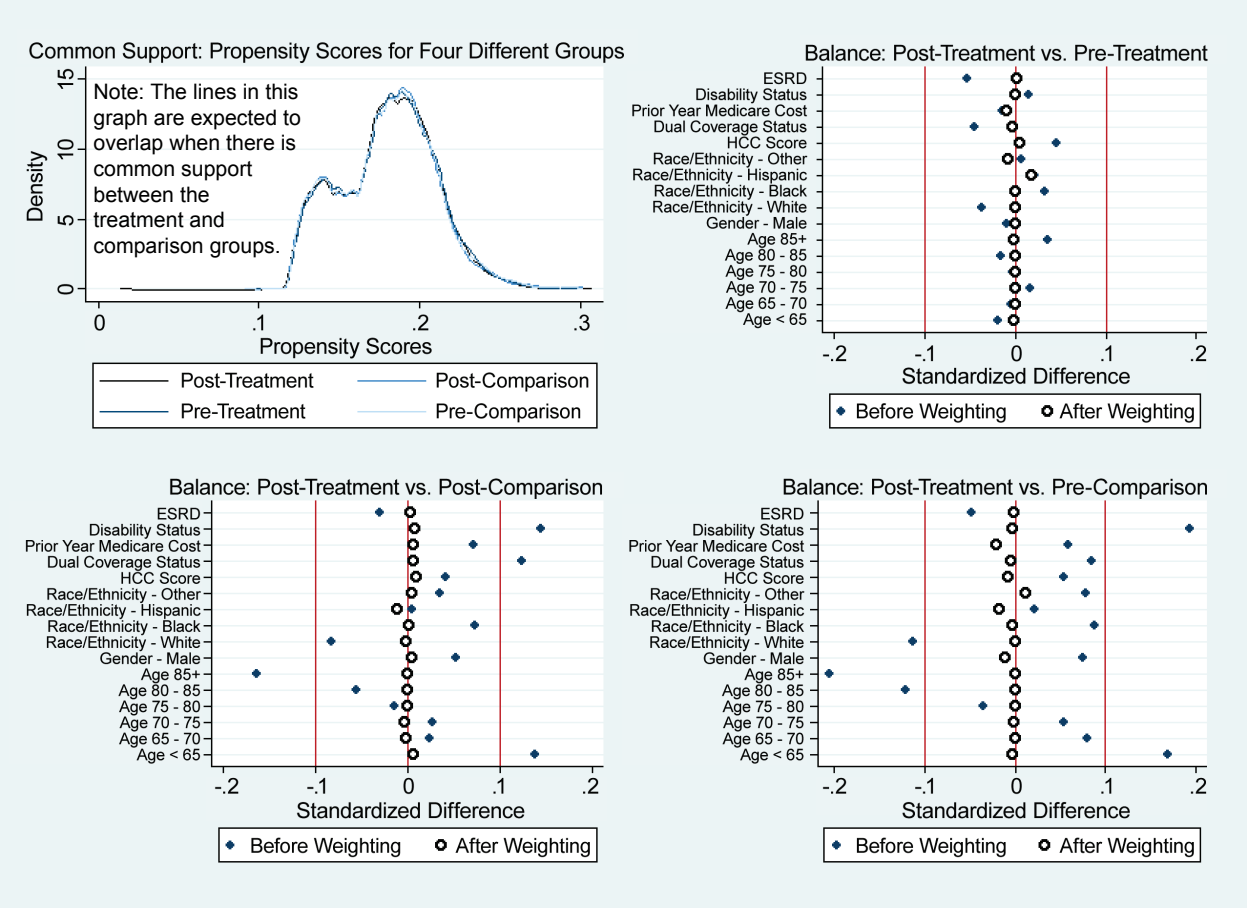
[91] The comparison group for this analysis consists of Medicare FFS beneficiary-episodes discharged from three comparison hospitals: The University of Maryland Medical Center, St. Agnes Hospital and Franklin Square Hospital. JHH is similar to the University of Maryland Medical Center, while Bayview is similar to St. Agnes Hospital and Franklin Square Hospitals, in case-mix and patient demographics.

incorporate these relative weights into our analysis to minimize observed differences in beneficiary-episode characteristics among the four groups.

Exhibit JCHiP.4 presents results of our tests for common support and balance in covariates across treatment and comparison groups.

- We observe a high level of overlap in distribution of estimated propensity scores across J-CHiP post-treatment, post-comparison, pre-treatment, and pre-comparison group patient-episodes.
- The standardized difference between J-CHiP post-treatment and one of three other (post-comparison, pre-treatment, and pre-comparison) group beneficiary-episodes across all covariates is negligible after incorporating relative weights.

Exhibit J-CHiP.4: Test of Common Support and Covariate Balance



Model. We compare the change in outcomes between treatment and comparison groups, across the entire post-intervention period (April 1, 2013, through September 30, 2014) and the pre-intervention period (January 1, 2011, through June 30, 2012), in a DID analysis (Exhibit JCHiP.6). We use generalized linear models (GLM) with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a GLM with a log link and a gamma distribution. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{ Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{ Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Results

Descriptive Characteristics. Exhibit JCHiP.5 displays the descriptive characteristics of J-CHiP beneficiary-episodes before, during, and after implementation of the intervention. We compare discharges occurring in the post-intervention period for the J-CHiP and comparison groups with respect to demographics, comorbidities, and prior utilization and test differences between the two periods, using a t-test for continuous measures (comorbidities and utilization before index hospitalization) and a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition). In the post-intervention period, beneficiaries discharged from J-CHiP are more likely to be younger and to be identified as African American or Black. J-CHiP's beneficiary-episodes are likely to have higher hierarchical condition category (HCC) scores and more comorbidities relative to beneficiary-episodes discharged from the comparison hospitals. They also tend to have higher prior utilization (number of hospitalizations or ED visits) and cost, are more likely to be disabled, and are more likely to be discharged to home health than are beneficiary-episodes discharged from the comparison hospitals in the same period. In this report, we use propensity score relative weighting as described earlier, to adjust for observed differences in baseline covariates across treatment and comparison groups.

Exhibit J-CHiP.5: Descriptive Characteristics for the J-CHiP and Comparison Group Beneficiary-Episodes, Pre and Post Implementation

Variable	Pre-Intervention		Ramp-up		Post-Intervention	
	J-CHiP	Comparison	J-CHiP	Comparison	J-CHiP	Comparison
Number of Beneficiary-Episodes	**27,691**	**36,265**	**6,562**	**17,047**	**20,535**	**32,853**
Age * % (N)**						
<65 years old	33.1 (9155)	24.5 (8902)	30.2 (1982)	24.5 (4169)	32.1 (6599)	26.0 (8526)
65-69 years old	17.9 (4943)	14.7 (5331)	16.5 (1085)	15.5 (2643)	17.7 (3629)	16.9 (5537)
70-74 years old	15.2 (4210)	13.9 (5037)	15.2 (998)	14.3 (2440)	15.8 (3243)	14.8 (4870)
75-79 years old	12.7 (3515)	13.7 (4982)	13.2 (868)	13.5 (2301)	12.6 (2582)	13.1 (4289)
80-84 years old	10.7 (2959)	14.2 (5135)	10.7 (703)	13.9 (2368)	10.2 (2094)	11.9 (3918)
≥ 85 years old	10.5 (2909)	19.0 (6878)	14.1 (926)	18.3 (3126)	11.6 (2388)	17.4 (5713)
Race/Ethnicity * % (N)**						
White	66.9 (18519)	70.4 (25524)	63.9 (4194)	70.2 (11972)	65.2 (13381)	69.0 (22678)
Black	30.2 (8371)	27.8 (10066)	33.3 (2185)	27.1 (4622)	31.7 (6517)	28.4 (9334)
Other	2.9 (801)	1.9 (675)	2.8 (183)	2.7 (453)	3.1 (637)	2.6 (841)
Gender * % (N)**						
Female	51.8 (14331)	56.0 (20307)	54.4 (3570)	55.6 (9473)	52.3 (10730)	54.8 (17991)
Hierarchical Condition Categories (HCC)						
Mean Count of HCCs (Standard Deviation) ***	5.1 (3.5)	5.1 (3.6)	5.5 (3.5)	5.1 (3.5)	5.5 (3.6)	5.2 (3.5)
Mean HCC Score (SD) ***	3.1 (2.1)	3.1 (2.2)	3.3 (2.1)	3.1 (2.2)	3.2 (2.1)	3.2 (2.2)
Mean Utilization and Cost in Year Prior to Index Hospital Discharge						
Hospitalizations per 1,000 (SD) ***	2,468 (16,825)	1,889 (4,681)	2,288 (4,044)	1,663 (4,375)	2,196 (6,990)	1,633 (7,282)
ED Visits per 1,000 (SD) ***	2,015 (6,934)	1,452 (4,758)	2,222 (7,923)	1,366 (3,279)	2,200 (7,186)	1,404 (3,301)
Total Medicare Cost (SD) ***	$66,410 ($590,143)	$50,529 ($90,664)	$58,157 ($135,907)	$48,351 ($103,569)	$60,180 ($222,721)	$49,810 ($139,870)
Coverage Reason * % (N)**						
Age	56.7 (15709)	65.6 (23784)	57.7 (3785)	65.5 (11173)	56.4 (11574)	63.1 (20735)
Disability	38.4 (10644)	29.7 (10774)	38.5 (2526)	30.2 (5154)	39.9 (8191)	32.5 (10689)
ESRD	1.8 (486)	1.5 (542)	1.4 (90)	1.3 (230)	1.4 (293)	1.7 (547)
Disability and ESRD	3.1 (852)	3.2 (1165)	2.5 (161)	2.9 (490)	2.3 (477)	2.7 (882)
Discharges * % (N)**						
Home	60.8 (16839)	60.1 (21785)	55.1 (3613)	57.2 (9743)	55.4 (11375)	57.0 (18741)
SNF	6.4 (1763)	15.4 (5602)	7.9 (516)	15.3 (2616)	10.5 (2158)	13.4 (4387)
HHA	12.8 (3545)	6.4 (2304)	18.6 (1221)	7.7 (1319)	18.5 (3792)	7.8 (2564)
Hospice	1.5 (413)	1.7 (633)	2.1 (135)	2.2 (375)	1.7 (339)	2.2 (709)
Other	18.5 (5131)	16.4 (5941)	16.4 (1077)	17.6 (2994)	14.0 (2871)	19.6 (6452)

NOTES: *p<0.10, **p<0.05, ***p<0.01.
Statistical significance is assessed using chi-squared tests for proportions and t-tests for continuous variables comparing J-CHiP to the comparison groups during the pre-, ramp-up, and post-intervention periods. Categorical variables are listed as % (N) and the count and continuous variables are listed as mean (SD).

DID Analysis. Results presented in Exhibit JCHiP.6 represent the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before*

implementation of the intervention. This adjusted model assesses the impact of the awardee's program across the entire post-implementation period.[92]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: The J-CHiP program is not associated with decreases in 90-day hospitalizations, 90-day ED visits, or 30-day readmissions, relative to the comparison group. Relative to the comparison group, the J-CHiP program is associated with a significant increase in 90-day hospitalizations (17 episodes per 1,000 beneficiary-episodes).
- Cost Measures: The J-CHiP program lowers 90-day cost of care for its beneficiary-episodes (-$494 per beneficiary-episode), relative to the comparison group; this difference is not statistically significant.
- Quality of Care Measures: The J-CHiP program is not associated with higher 7-day and 30-day practitioner visit follow-up for its beneficiary-episodes, relative to the comparison group.

Exhibit J-CHiP.6: Difference-in-Differences Estimates for the J-CHiP Hospital Program

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	17 [2, 31] **
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	3 [-12, 19]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	5 [-8, 18]
90-Day Total Cost of Care per Beneficiary-Episode ($)	-$494 [-$2,198, $1,209]
7-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	-12 [-25, 2]
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	-3 [-17, 10]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. The key limitation of our analyses is that we do not account for differences between the pre- and post-intervention populations at the Johns Hopkins Hospital (JHH), which are systematically different because the J-CHiP program was initially implemented only in certain units in the hospital and not others. In contrast, the pre-intervention "treatment" group is drawn from *all* JHH units. It is not possible to identify from claims the unit from which a patient was discharged. For subsequent analyses, NORC will use a finder file from the awardee that identifies beneficiary-episodes during the pre-intervention period that were discharged from those units in JHH where J-CHiP's intervention was ultimately established, which will improve the validity of the analysis.

Analysis 2: Community Arm

Model. We employ a time-series analysis comparing the change in outcomes for program participants in the periods *before* and *after* enrollment in the program. In the two time periods, we use repeated measures on program participants, obtained per quarter, before or after enrollment in the program. We use population-averaged logistic models with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a time-series

[92] Adjustment factors include age category, race/ethnicity, gender, prior year utilization, dual eligibility indicator, hospital episode length, discharge disposition, HCC score, ESRD indicator, and disability indicator.

generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta Participant_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the t^{th} *Time* period. *Time i*s specified an indicator variable denoting the post-intervention period and **α** is the effect observed after enrollment in the program; *Participant* is a vector of participant demographic and clinical variables; and **β** is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, **α** is the effect of the program on outcomes over the entire post-intervention period.

Results

Descriptive Characteristics. Exhibit JCHiP.7 displays the descriptive characteristics of Medicare FFS beneficiaries in J-CHiP's community arm, with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment. This group is majority female (63 percent) and identified as African American or Black (55 percent), and approximately half are dually eligible.

Exhibit J-CHiP.7: Descriptive Characteristics for J-CHiP Community Arm's Populations

Variable	Value
Number of Medicare Beneficiaries	1,713
Mean Number of Quarters Enrolled [Range]	4.2 [2 - 8]
Gender % (N)	
Female	62.7 (1074)
Age Group % (N)	
<65 years	31.3 (536)
65-69 years	12.6 (215)
70-74 years	12.0 (206)
75-79 years	14.0 (240)
80-84 years	12.4 (212)
≥85 years	17.7 (304)
Race/Ethnicity % (N)	
White	43.9 (752)
Black	54.6 (936)
Other	1.5 (25)
Dual Eligibility % (N)	
Dually Enrolled	46.6 (798)
Coverage Reason % (N)	
Age	54.3 (931)
Disability	41.7 (715)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	2.5 (1.7)
Mean Count of HCCs (SD)	4.2 (3.0)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$33,948 ($56,573)
Hospitalizations per 1,000 (SD)	1219.5 (2173.7)
ACS Hospitalizations per 1,000 (SD)	349.7 (1201.0)
30-Day Readmissions per 1,000 (SD)	391.1 (1482.4)
ED Visits per 1,000	1833.0 (5365.1)

Time Series Analysis. We present the differences in utilization and cost for participants, before and after enrollment in the J-CHiP community program, in Exhibit JCHiP.8.[93] The results for utilization outcomes (hospitalizations, ACS hospitalizations, 30-day readmissions, and ED visits) and cost of care are the adjusted marginal effect per quarter of enrollment in the program.

The model-based estimates indicate the following, relative to the pre-intervention period:

- Utilization Measures: We observe non-significant increases in hospitalizations and ED visits of 5.4 per 1,000 beneficiaries and 11.9 per 1,000 beneficiaries in the post-intervention period, respectively. We also observe non-significant increases in 30-day readmissions (17 per 1,000 beneficiaries)
- Cost Measures: We observe a significant increase of $1,328 in total cost of care per beneficiary per calendar quarter in the post-intervention period.
- Quality of Care Measures: We observe non-significant increase ACS hospitalizations (1.6 per 1,000 beneficiaries) in the post-intervention period

Exhibit J-CHiP.8: Utilization and Cost Differences for J-CHiP Community Participants before and after Enrollment

Outcome	Adjusted Difference‡ [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	5.4 [-5.7, 16.5]
ED Visits (Likelihood per 1,000 Beneficiaries)	11.9 [-0.1, 24.0]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	17.2 [-8.4, 42.8]
Total Quarterly Cost of Care per Beneficiary ($)	**$1,328 [$773, $1,883] *** **
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	1.6 [-5.1, 8.3]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis of the J-CHiP community program is limited by the lack of a suitable comparison group of high-risk community dwelling Medicare beneficiaries with which to compare the observed increases in utilization and cost measures for program participants. In subsequent analyses, we plan to construct such a comparison group of high-risk Medicaid beneficiaries residing in the community from a Maryland Medicaid data set provided to NORC by the State.

Summary

Claims-based Analysis. Our DID analyses to date of J-CHiP's post-acute program show no favorable change in core measures of utilization or cost. Our time-series analyses of J-CHiP's community-based program shows significant increases in total cost of care for its participants after enrollment in the program, as well as non-significant increases in utilization measures, a result that is difficult to interpret in the absence of a comparison group.

[93] Adjustment factors include post-intervention indicator, age category, gender, race/ethnicity, extent of FFS coverage, dual coverage indicator, HCC score, ESRD indicator, and disability indicator.

Sustaining and Scaling the J-CHiP Program. As already mentioned, J-CHiP's community intervention arm received a 12-month no-cost extension, with funding supporting the intervention until early 2016. To support the intervention over the long-term, Johns Hopkins is exploring community-based grant initiatives and recently submitted a proposal to BUILD, a national nonprofit consortium of foundations that funds community collaborations to improve health. Aspects of J-CHiP's post-acute and SNF intervention, including multidisciplinary rounding, team collaboration with behavioral specialists and pharmacy extenders, patient education, and collaboration with the five partner SNFs, will continue in some form supported by the institutions involved. Maryland's global budget revenue payment policy, overseen by the Health Services Cost Review Commission (HSCRC), provides unique challenges and opportunities for J-CHiP, and Johns Hopkins continues to discuss and explore state funding mechanisms to support the post-acute and SNF intervention activities. HSCRC recently awarded a planning grant to The Johns Hopkins Health System, to help develop a Regional Health Partnership in Baltimore City, which could help to extend the J-CHiP intervention to community partners in the region.

Data Collection and Analysis: Survey Development

NORC has received survey data, from a modified CAHPS instrument, for 329 patients and will look into the feasibility of conducting analyses for future reports to CMMI. We anticipate receiving data from J-CHiP's workforce survey for participating SNFs later this year (2015) and plan to include an analysis of that data in subsequent reports.

References

HCIA Narrative Progress Report for the Johns Hopkins University, for Reporting Quarter End Date 3/31/2015. Johns Hopkins University, 2015.

HCIA Quarterly Report for the Johns Hopkins University, for Reporting Quarter End Date 3/31/2015. Johns Hopkins University, 2015.

Johns Hopkins University School of Nursing

This chapter updates NORC's evaluation of the Johns Hopkins University School of Nursing (JHU SON) program entitled "Project Community Aging in Place, Advancing Better Living for Elders" (Project CAPABLE). Project CAPABLE provides a highly personalized combination of services to older adults who are dually eligible Medicare and Medicaid beneficiaries and who live independently in Baltimore, MD. The project aims to help beneficiaries achieve greater independence, including living in their homes longer, in order to improve health in this population and reduce rates of nursing home and hospital admissions. Project CAPABLE uses a team led by an occupational therapist and an RN, with assistance from non-clinical staff, to coach clients to identify one to three functional goals and work together to achieve these goals over three to four months, in what the awardee describes as "a client-directed home-based intervention."

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

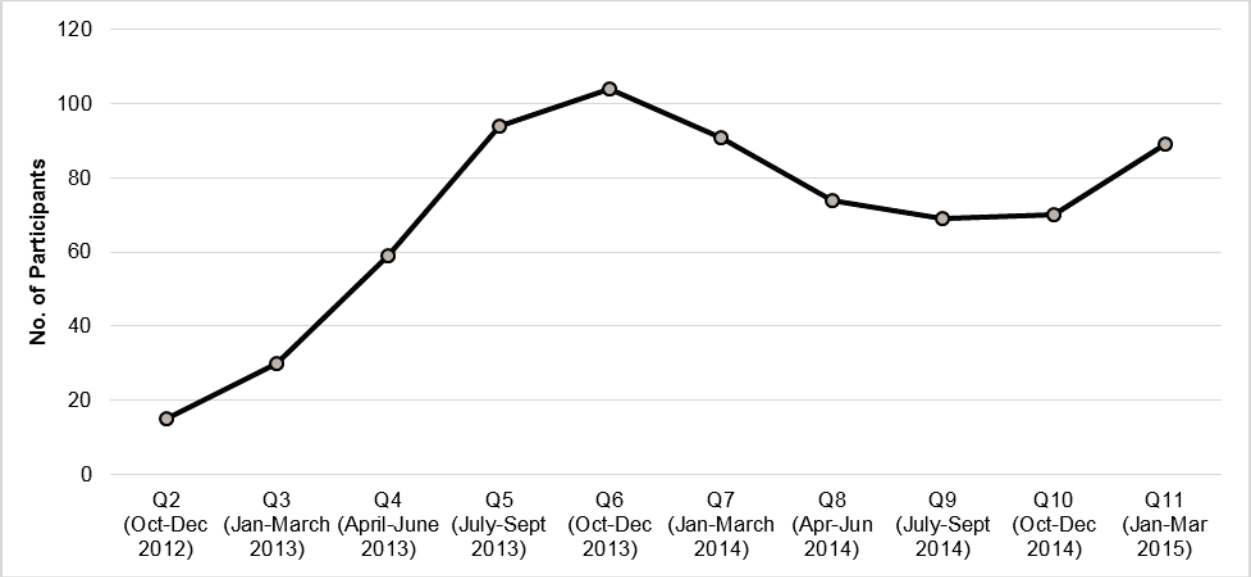
Overview of Awardee

CMMI Category for Awardee:	Academic/Universities
Funding Amount:	$4,093,356
Launch Date:	11/12/2012
State(s) Where Located:	Maryland

Patients Targeted and Served

Self-reported data from JHU SON provides enrollment data by HCIA reporting quarter, as shown in Exhibit JHUSON.1. Counts are included for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA grant, where the services are not supported by the grant). The data show a rapid increase through Q6, followed by a decline through Q10 and a slight increase through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 89 unique participants, both direct (85 participants) and indirect (four participants). As of March 31, 2015, Project CAPABLE had served a cumulative total of 258 unique direct participants since program launch, 97 percent of the total number projected to be served over the three years of the HCIA-funded program (267 participants).

Exhibit JHUSON.1: Total Number of JHU SON Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Participants are either older than 75 years (35 percent) or between 65 and 74 years of age (65 percent).
- Gender: 77 percent of participants are female.
- Racial and Ethnic Identity: Most participants are identified as Black or African American (73 percent), and 22 percent as White.

Update: Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), Project CAPABLE has made few changes to its model, as staff, operating protocols, and participants are shared between the HCIA-funded pilot and an ongoing NIH-supported double-blind (randomized control) trial of the CAPABLE model. While there has been some staff turnover, as the HCIA grant completes its initial 3 year period, the awardee has noted their success in retaining trained clinical staff. Citing the ongoing challenge of recruiting participants when the intervention is not formally part of a clinical practice or hospital, the awardee's leadership team attribute their success in outreach and enrollment to strong relationships with partners like the Maryland Department of Health and Mental Hygiene for outreach and marketing. In addition to significant involvement in advising replication of the program model nationally and internationally, Project CAPABLE is exploring future avenues to sustainability locally, as Maryland hospitals and the state Medicaid program move toward value-based purchasing (e.g., Medicaid waiver or ACO).

Communications and Health IT. The awardee has used the web-based REDCap system to manage project data for both the HCIA-supported pilot and the NIH RCT, data are gathered on Android tablets in the field, together with Excel spreadsheets to track operations. This system, however, is not used for provider communications.

Patient and Caregiver Engagement. Engagement is promoted through a series of structured home visits. Enrollment begins with two visits by an occupational therapist, who assesses ADLs and IADLs, asks the client to prioritize needs, carries out an environmental assessment, and arranges for home repairs that will support improved functioning and safety. After the first month, OT visits alternate with home visits by an RN, who works with the client on steps to reach one or more goals; the intervention delivers a total of six OT and four RN visits over the course of four to five months. As one staff member described the process, "[the clients] choose what they want to work on… You develop the target areas and what their goals are. It's a trust building visit. And then the second visit you brainstorm on the target areas. You teach them the brainstorming [technique]. Then the nurse does the CAPABLE exercises and medication list…Then visit three is the action plans and solutions to the problems. And visit four is more action plans and wrap up. I think some patients would benefit from additional repetition, and some people are needier. It just takes longer than the 4-5 month period."

Although the program targets clients who often live independently, it can also benefit those with caregivers. As a primary caregiver noted about her mother, "you were very helpful, you made her laugh and I like the way you explained everything to her and not me….I like the way you were talking with us and not at us..." (HCIA project files, n.d.). Another clinician summarized the powerful motivation of client goal-setting, "Being trained as a nurse, I was telling patients 'Your blood sugar should be X and blood pressure (BP) should be X' and they came back with the same numbers. But here you are waiting to hear what they want to do. And that motivates them to do the work. Here, they have the voice. (NORC Focus Group, April 8, 2014)

While the awardee does not measure patient engagement directly as part of self-monitoring, there are indirect measures, including client satisfaction, changes in functional status (ADL, IADL), and client-reported changes in perceptions about home safety. Evidence to date about the effectiveness of patient engagement is limited, based on NORC's site visit and anecdotal findings presented by the awardee; NORC anticipates receiving survey data from the awardee, which will enable a more systematic and comprehensive analysis.

Fidelity, Adaptability, and Self-Monitoring. Given the linkage of the HCIA-supported pilot with the NIH RCT, the awardee has emphasized maintaining fidelity to the initial model as launched, for example, through weekly project oversight meetings on the subject of model fidelity. Self-monitoring extends beyond the core CMMI performance measures to gather data on key objectives of the program model, related to change between baseline and follow up in the number of activities of daily living (ADLs) and instrumental activities of daily living (IADLs), in participants' self-rated health, the average number of home hazards, falls, depression, and quality of life (including level of pain).

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of time series analyses for Medicare Fee-For-Service (FFS) beneficiaries enrolled in Project CAPABLE from July 1, 2012, through September 30, 2014. Medicare FFS beneficiaries comprise 52 percent of the awardee's targeted patients. In this report,

no comparison group is used; we plan to include a comparison group in the following quarterly report, drawn from Maryland Medicaid data. Examining use of hospital-based services and total Medicare costs, we observe increases in all measures for Project CAPABLE participants during the post-intervention period compared to the pre-intervention period, although these increases are not statistically significant.

Measures. Findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total annual cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

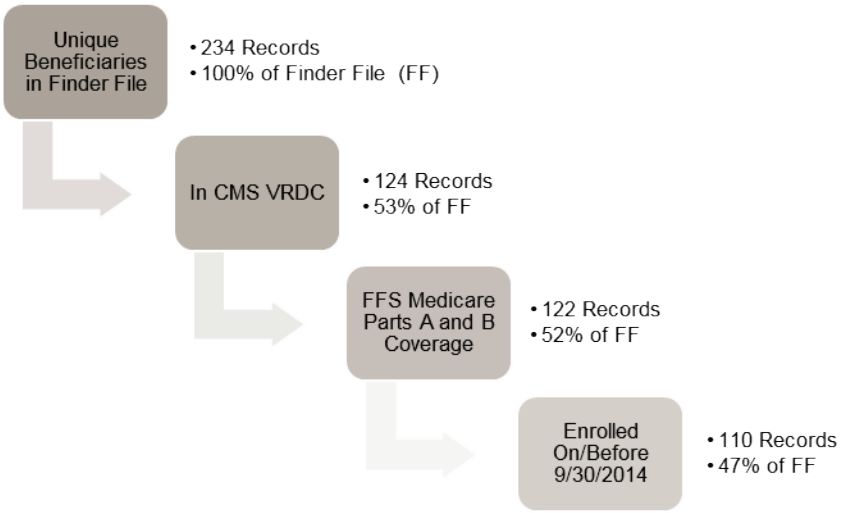
Research Question. For each measure, what is the change in outcome for participants after enrollment in Project CAPABLE?

Analytic Approach. We specify and employ a time-series model, comparing the experiences of participants in JHU SON's Project CAPABLE program between the pre- and post-implementation periods.

Finder File and Creation of Analytic Sample. JHU SON provided a finder file that lists its program participants and their enrollment dates, enabling us to pull Medicare claims for these beneficiaries to calculate outcome measures.[94] As shown in Exhibit JHUSON.2, the finder file identified 234 unique participants in Project CAPABLE. We have matched 124 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC); 122 of these are FFS Medicare beneficiaries during the month of program enrollment. One hundred ten (110) participants enrolled by the cut-off date of September 30, 2014, comprising our analytic sample.

[94] Medicare claims are available through December 31, 2014, for the analysis in this report. We use September 30, 2014 as the cut-off date to account for the 90-day claims runoff.

Exhibit JHUSON.2: FFS Medicare Beneficiaries Identified Through JHU SON Finder File



Analysis

Model. We employ population-averaged logistic models with binary outcome variables for utilization (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we use a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta \text{Participant}_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the t^{th} *Time* vector. *Time* is specified as an indicator variable denoting the post-intervention period; $\boldsymbol{\alpha}$ is a vector of effects corresponding to the relevant time variables in the models; *Participant* is a vector of participant demographic and clinical variables; and $\boldsymbol{\beta}$ is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, the primary outcome of interest is the difference between $\boldsymbol{\alpha}$ for the post-intervention period and $\boldsymbol{\alpha}$ for the pre-intervention period.

Results

Descriptive Characteristics. Exhibit JHUSON.3 displays the descriptive characteristics of Project CAPABLE Medicare FFS beneficiaries with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment. Of the 110 participants in our analytic file enrolled for at least one quarter in Project CAPABLE, the average number of quarters of enrollment is 5.8, with the longest enrollment being 12 quarters. Because too few program participants have been enrolled for nine or more continuous quarters (n=10) to observe meaningful trends, the analysis is limited to the first eight quarters of enrollment. Most participants are female (86 percent) and Black (79 percent). About 85 percent of participants are dually enrolled, and about two-thirds (65 percent) of all participants gained Medicare coverage at age 65 years.

Exhibit JHUSON.3: Descriptive Characteristics for the CAPABLE Program Enrollees

Variable	Value
Number of Persons	**110**
Mean Number of Quarters Enrolled [Range]	**5.8 [2 - 12]**
Gender % (N)	
Female	86.4 (95)
Age Group % (N)	
65-69 years	29.1 (32)
70-74 years	24.5 (27)
75-79 years	11.8 (13)
80-84 years	22.7 (25)
≥85 years	11.8 (13)
Race/Ethnicity % (N)	
White	18.2 (20)
Black	79.1 (87)
Other	2.7 (3)
Dual Eligibility % (N)	
Dually Enrolled	84.5 (93)
Coverage Reason % (N)	
Age	64.5 (71)
Disability	35.5 (39)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	1.8 (1.3)
Mean Count of HCCs (SD)	2.8 (2.4)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$18,415 ($26,312)
Hospitalizations per 1,000 (SD)	481.8 (964.8)
ACS Hospitalizations per 1,000 (SD)	109.1 (456.3)
30-Day Readmissions per 1,000 (SD)	90.9 (319.0)
ED Visits per 1,000 (SD)	654.5 (1070.3)

Time Series Analysis. We display the differences in cost and utilization between the pre- and post-intervention periods for Project CAPABLE in Exhibit JHUSON.4.[95] The results for utilization outcomes (hospitalizations, 30-day readmissions, and ED visits) and ACS hospitalizations are the adjusted marginal differences from the population-averaged logistic models for the number of participants with the outcome, and the result shown for total cost of care is the adjusted marginal difference for the post-intervention period from the gamma distribution GEE model.

The model-based estimates indicate the following, relative to the pre-intervention period:

- Utilization Measures: We observe non-significant increases in hospitalizations, 30-day readmissions, and ED visits of 15.5 per 1,000 beneficiaries, 10.3 per 1,000 beneficiaries, and 7.0 per 1,000 beneficiaries, respectively, in the post-intervention period. These changes in utilization during the post-intervention period amount to an increase of 1.7 hospitalizations, 1.1 30-day readmissions, and 0.8 ED visits in the small population of program participants.

[95] Adjustment factors include post-intervention indicator, age category, race/ethnicity, extent of FFS coverage, extent of dual eligibility, HCC score, and disability indicator.

- Cost: We observe a non-significant increase of $729 in total cost of care per quarter per beneficiary in the post-intervention period.
- Quality of Care Measures: We observe a non-significant increase in ACS hospitalizations of 10.2 per 1,000 beneficiaries in the post-intervention period. Given the small sample size, this change in utilization amounted to an increase of 1.1 ACS hospitalizations in the population during the post-intervention period.

Exhibit JHUSON.4: Utilization and Cost Differences for the CAPABLE Program Participants before and after Implementation

Variable	Adjusted Rate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	15.5 [-16.8, 47.8]
ED Visits (Likelihood per 1,000 Beneficiaries)	7.0 [-30.1, 44.2]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	10.3 [-10.8, 31.3]
Total Cost of Care per Beneficiary ($)	$729 [$-636, $2,094]
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	10.2 [-8.6, 29.0]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. One limitation of this analysis is that we do not have a comparison group for the awardee and thus cannot compare these results to a similar population that does not receive the Project CAPABLE intervention. A second serious limitation is the size of the program (258 participants) and the even smaller analytic sample (110). In future reports, we plan to present results for a comparison group and also examine utilization using Medicaid data, which should allow us to observe a larger proportion of program participants.

Summary

Claims-based Analysis. Our quantitative analyses of the Project CAPABLE program shows non-significant increases in hospitalizations, 30-day readmissions, ACS hospitalizations, ED visits, and total cost of care for its participants in the post-intervention period compared to the pre-intervention period. Participants in Project CAPABLE have functional limitations and complex health care needs, and small increases in rates of utilization over time in this population are not surprising.

Sustaining and Scaling Project CAPABLE. JHUSON has received a 12 month no-cost extension for HCIA 1 funding, which will enable the awardee to restart enrollment, continue to deliver services as part of the intervention, and to analyze claims data; pending analyses of potential cost savings is expected to be critical in determining the long-term sustainability of the CAPABLE model, as well as its prospects for replication. Even before cost analyses are completed for the HCIA-funded pilot, awardee leadership have been consulting with multiple replication efforts underway in Michigan (a pilot in Flint and scaling up to be part of a state Medicaid waiver), Maine (sponsored by the Portland housing authority), and Australia (pilot targeting clients with mild cognitive impairments), as well as developing new grant-based pilots in New Mexico and New York.

Data Collection and Analysis: Survey Development

JHU SON administers a baseline client survey as part of initial enrollment into CAPABLE, as well as a satisfaction survey to clients at four to five months post enrollment. The baseline survey includes questions on many topics, including ADLs, IADLs, physical and mental health, falls, and home hazards. The satisfaction survey includes questions about interactions with CAPABLE staff, benefits to the client/proxy from the program (e.g., helped client take better care of self), and activities in which the client participated in the last month. In August 2015, JHU SON shared data from the baseline and satisfaction surveys collected through June 2015. NORC plans to review and analyze these survey results and discuss findings in future reports to CMMI.

References

"OT Worksheets: Assessments." Johns Hopkins University School of Nursing.

"OT Worksheets: Action Plan(S)." Johns Hopkins University School of Nursing, 2010.

"OT Worksheets: Session to Session Procedures." Johns Hopkins University School of Nursing, 2012.

"RN Worksheets: Action Plan(S)." Johns Hopkins University School of Nursing, 2013.

"RN Worksheets: Assessments." Johns Hopkins University School of Nursing, 2013.

"RN Worksheets: Session to Session Protocols." Johns Hopkins University School of Nursing, 2013.

"Work Order Forms." Johns Hopkins University School of Nursing, 2013.

"Baseline Questionnaire." Johns Hopkins University School of Nursing, 2014.

"CAPABLE Participant Testimonials." Johns Hopkins University School of Nursing, 2014.

Q11 HCIA Narrative Progress Report: Johns Hopkins School of Nursing. Johns Hopkins University School of Nursing, 2015.

Group, The Lewin. *11QR Quarterly Awardee Performance Report: Johns Hopkins University School of Nursing*. The Centers for Medicare and Medicaid Services, 2015.

Szanton, Sarah. "A Common-Sense Approach to Helping People Age in Place." *Healthy Homes, Happy Families*2012, 7.

LifeLong Medical Care

This chapter updates NORC's evaluation of the LifeLong Complex Care Initiative (LCCI). LCCI targets low-income adults living with disabilities and those with multiple chronic conditions who are enrolled in the Alameda Alliance for Health, a Medi-Cal managed care organization. LCCI offer health care, care coordination, home visits, and participant engagement, including workshops in independent living skills offered by nonprofit community partner, the Center for Independent Living, at three federally qualified health centers (FQHCs) in the city of Berkeley. The participants targeted are at high-risk for emergency room utilization and avoidable hospitalizations, due to complex medical status that is often compounded by social needs. The program employs a holistic approach to address the medical and social needs of participants, providing clinical case management by an RN care manager embedded in each FQHC and peer support through one-on-one coaching and workshops. The LCCI's goal is to increase participants' independence and self-management, in order to improve health outcomes and reduce inappropriate utilization. The LCCI was developed in anticipation of a county-wide coordinated care initiative that did not materialize for Alameda County, and plans to sustain and scale the intervention rely on continued movement toward capitation in the local Medicaid market.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015), and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

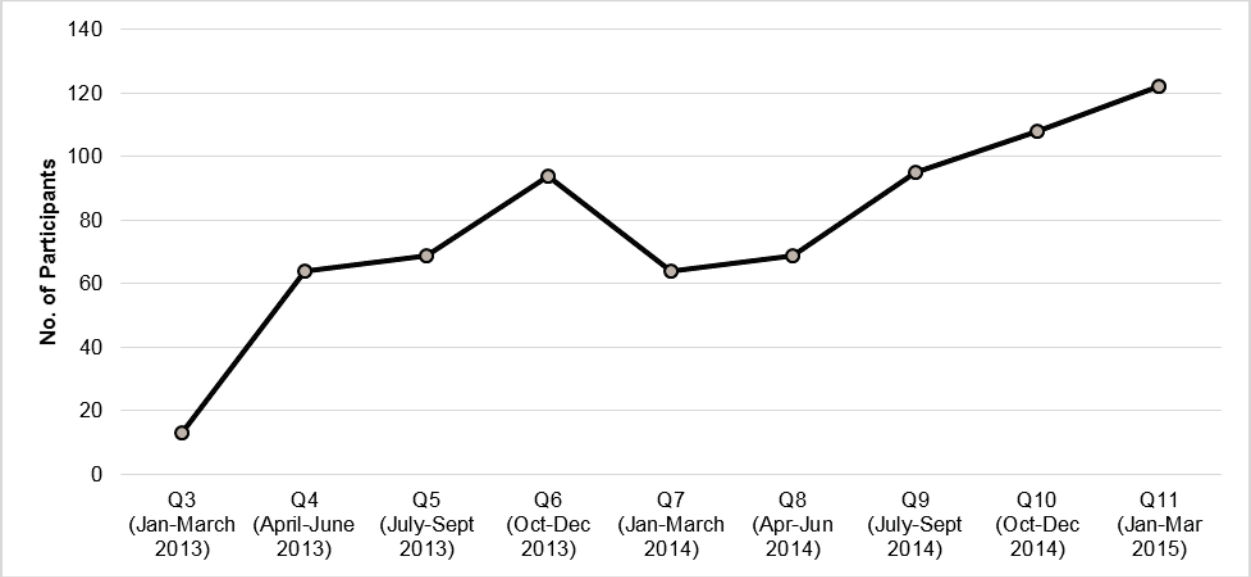
Overview of Awardee

CMMI Category for Awardee:	FQHC/CHC
Funding Amount:	$1,109,231
Launch Date:	2/26/2013
State(s) Where Located:	California

Patients Targeted and Served

Self-reported data from LCCI provides enrollment data by HCIA quarter, as shown in Exhibit LCCI.1. The data show an increase through Q6, followed by a decline through Q7, and a subsequent increase through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 122 participants. At any one point in time, the census of enrollees may include those who moved into and out of the program in past quarters. As of March 31, 2015, LifeLong's program has served a total of 308 participants since program launch, 87 percent of the total number projected to be served over the three years of the HCIA-funded program (356 participants).

Exhibit LCCI.1: Total Number of LCCI Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Participants between the ages of 26 and 64 years are the largest group of enrollees (70 percent). Elders ages 65 through 74 years make up 16 percent and those ages 75 and older, 14 percent.
- Gender: More females than males are enrolled (63 percent).
- Racial and Ethnic Identity: Just over half of participants are identified as Black or African American (55 percent). Whites comprise 26 percent of participants, Hispanic or Latino participants 12 percent, and Asian participants three percent. 15 percent of patients have an unknown or unreported race/ethnicity.

Update: Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), LifeLong has continued to implement its program model fully, leveraging the strength of its long-time community partner, the Center for Independent Living, and developing new means to secure both Medicaid managed care enrollees and data to better target and monitor their intervention. One important aspect seen with full implementation over the three years has been culture change for LifeLong's 600+ clinicians, who have been trained to work closely with peer counselors at the Center for Independent Living, as part of a team.

Communications and Health IT. Data sharing for targeting and monitoring purposes was in place initially with the Alameda Alliance for Health and, subsequently, for health plan partner Care First. LifeLong has further developed a data-sharing partnership with area hospitals, to gain access to a list of LifeLong patients who have recently entered a hospital ED and who should follow up at a clinic within 24 hours of discharge. In addition, during 2015, LifeLong has received a new data feed from a community health center network that is supported by health plans, providing near real-time data on ED visits; these data must be flagged on LifeLong's EHR, which is not integrated into this data feed. Finally, a recent

partnership with Sutter Health supports a nurse, who tracks LifeLong clients at two local Sutter hospitals and notifies LifeLong when a post-discharge follow up call is made to each client.

Patient and Caregiver Engagement. Patient engagement is a major focus of the LCCI intervention. Nurse care managers facilitate program enrollees' coordination of care by providing hands-on nursing services including communicating with the primary and specialty care physicians, self-management support, medical referrals, home visits, referrals to community resources, and referrals to the peer coaches and Living Well workshops. Peer coaches provide one-on-one sessions with participants and lead Living Well workshops. Living Well workshops are a series of eight to twelve weekly meetings attended by peers (seniors living with a disability) during which time they learn about and discuss issues related to living independently. Topics range and include nutrition, mental health, and self-advocacy or navigation in clinical settings. Peer coaches support program enrollees as they define, set, and work towards self-determined goals. Peer coaches encourage participants to achieve their goals by teaching them strategies to access and to use tools and services to manage their lives, according to participant preferences, and by employing motivational interviewing to encourage participant decision-making around social and medical issues. As one participant said about the Living Well Workshop: "Groups like the one that [the peer coach] runs, helps because you don't feel alone. You don't feel like you are the only one you are facing it."

Nurse care managers and peer coaches work towards empowering participants by helping them set goals, promoting self-management strategies, and providing information and referrals to community services to help participants achieve self-management goals. Consumer focus groups indicate a high level of participant satisfaction. Most respondents noted that they feel empowered to live independently, advocate for themselves in clinical settings, and navigate social and medical systems. Participants explained that the nurse care managers made them feel "heard," were "heaven sent," and helped them gain access to care. Overall, participants reported feeling more in control of their well-being, have a higher quality of life, more timely access to care, and greater coordination of services (medical and social referrals).

Systematic and individual-level factors affect the success of participant engagement. At the systems or contextual level, these range from health care financing (e.g., peer coaching services are pre-authorized by AAH and the number of sessions are pre-determined) and infrastructure (e.g., access barriers posed by care delivery fragmentation and lack of community resources such as transportation) to cultural disconnects between the clinical orientation of FQHC staff and the Independent Living philosophy promoted through peer coaching and workshops. At the level of the individual, the impact of engagement may be moderated by degree of health literacy, culture (e.g., distrust of medical community), and financial barriers (e.g., for housing, or cost-sharing for medications).

Fidelity, Adaptability, and Self-Monitoring. A period of instability for the Alameda Alliance for Health (AAH), LifeLong's Medicaid managed care health plan partner, led the awardee to modify aspects of its program model post-launch. With AAH in receivership, payment for bills and data for targeting and recruitment of patients were both at least temporarily unavailable; once AAH was out of receivership, the health plan dropped their Medicare Advantage book of business, which meant that between one-third and one-half of LCCI enrollees were no longer covered by AAH and as a result, no longer eligible to participate in the intervention. LifeLong has responded by developing a partnership with Care First, a

health plan that is covering many of these enrollees, as well as seeking new means to recruit patients, for example, word of mouth referrals at its geriatric site, and new data-sharing arrangements that can inform more efficient targeting.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for participants in LifeLong's program. We use a comparison group of similar patients from the three intervention clinics. We find no clear patterns in utilization for LifeLong program participants.

Measures. Findings are presented for two measures:

- Annual hospitalizations per 1,000 beneficiaries
- Annual emergency department (ED) visits per 1,000 beneficiaries

Research Question. For each measure, what is the difference in outcome for enrollees in LifeLong's program and those of the comparison group?

Analytic Approach. We specify and employ a DID model, comparing the experiences of participants in LifeLong's program with those of a comparison group in the pre- and post-intervention periods.

Finder File and Creation of Analytic Sample. LifeLong provided a finder file of program participants and enrollment dates, enabling us to use health plan data for these Medi-Cal beneficiaries to calculate outcome measures. Alameda Alliance for Health, LifeLong's health plan partner, provided a file of claims incurred by LifeLong participants and approximately 10,000 comparators from FQHCs associated with LifeLong's program. The finder file identified 208 program participants, of which 207 were used in the analysis.

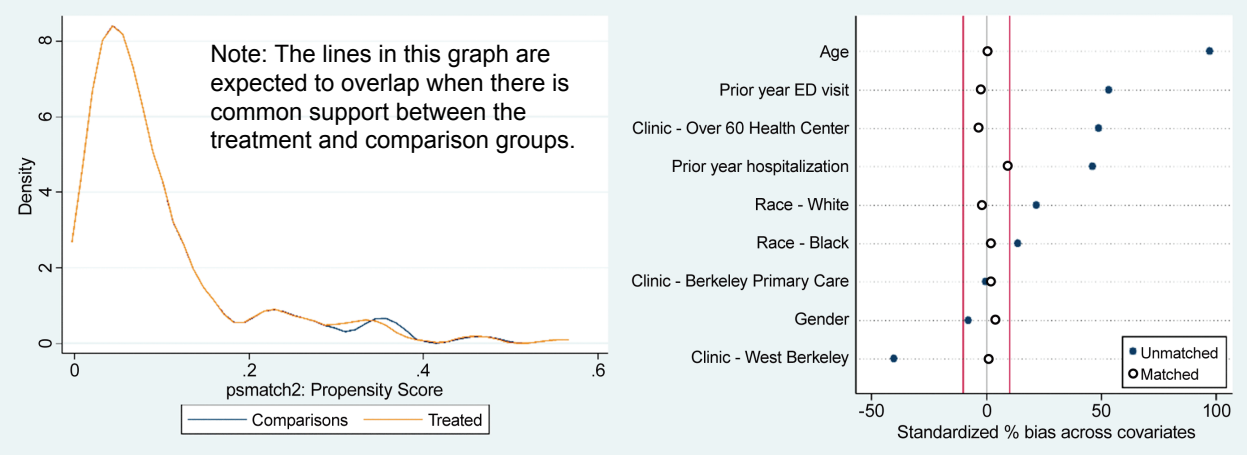
Comparison Group. We use propensity score matching with the claims received from Alameda Alliance to create a comparison group for the LifeLong participants. First, we created propensity scores based on age, gender, race, clinic, prior hospitalization, and prior ED visits. We then matched each LifeLong participant with one comparator with a similar propensity score. For more details on propensity score matching, please refer to Appendix C. One intervention participant was dropped from the sample in the matching process; thus, our final analytic file is comprised of 207 LifeLong participants and 207 matched comparators.

Exhibit LCCI.2 presents results of tests of common support and balance in covariates across treatment and comparison groups.

- After matching, we observe nearly identical overlap in the density curves for propensity scores in the treatment (shown in red) and comparison (shown in blue) groups, indicating equivalent propensity scores in both groups.

- In the matched sample, we were able to obtain balance on demographic covariates and prior year utilization measures (hospitalizations and ED visits). Overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison groups.

Exhibit LCCI.2: Test of Common Support and Covariate Balance



Analysis

Model. We present unadjusted results from a DID model using the propensity-matched analytic sample. LifeLong's program started enrollment in late February 2013, so many participants had only one full year of data in the claim records from the Alameda Alliance for Health; thus we are presenting only 1-year outcomes in this report. We construct 1-year outcomes for hospitalizations and ED visits. Because claims data were incomplete in regards to cost and secondary diagnosis codes, we are not able to create outcomes measures for total cost of care or ACS hospitalizations. In future reports, we hope to be able to increase the timeframe for our outcome measures to two years, as well as calculate cost and ambulatory care sensitive (ACS) hospitalization measures.

Results

Descriptive Characteristics. Exhibit LCCI.3 summarizes selected demographic and utilization characteristics for LifeLong participants and comparators included in the analytic sample. We observe no statistically significant differences in gender, age at enrollment, clinic distribution, and mean utilization (hospitalizations and ED visits) in the year prior to the intervention. The only significant difference observed was in the race variable; while race/ethnicity was reported in the finder file for all patients in the LCCI intervention, data on race/ethnicity were missing from the Alameda Alliance claims for some comparators. For seven percent of the comparators, race is unknown.

Exhibit LCCI.3: Descriptive Characteristics for the LCCI Participants and Comparison Group Members

Variable	LifeLong	Comparison
Number of Patients	207	207
Gender % (N)		
Female	62.8 (130)	60.9 (126)
Age at Enrollment % (N)		
<30 years	2.4 (5)	2.4 (5)
30-39 years	5.8 (12)	5.3 (11)
40-49 years	10.6 (22)	9.7 (20)
50-59 years	28.5 (59)	30.0 (62)
60-69 years	36.2 (75)	36.7 (76)
70-79 years	12.6 (26)	14.5 (30)
80-89 years	3.9 (8)	1.4 (3)
Race/Ethnicity % (N)**		
White	28.0 (58)	29.0 (60)
Black	47.8 (99)	46.9 (97)
Other	24.2 (50)	17.4 (36)
Unknown	0.0 (0)	6.8 (14)
Clinic % (N)		
Berkeley Primary Care	35.7 (74)	34.8 (72)
Over 60 Health Center	32.4 (67)	33.8 (70)
West Berkeley	31.9 (66)	31.4 (65)
Mean Utilization in Year Prior to Program Enrollment		
Mean Hospitalizations per patient (Standard Deviation)	0.6 (1.3)	0.3 (0.7)
Mean ED Visits per patient (SD)	1.3 (2.0)	1.0 (1.7)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. Results are presented in a table (Exhibit LCCI.4) that compares pre- and post-intervention periods. This model assesses the impact of the awardee's program across the entire post-implementation period. The DID estimator represents the difference in average outcome between the LifeLong participants and comparators *after* implementation of the intervention, minus the difference in average outcome between the treatment and comparators *before* implementation of the intervention.

The unadjusted results indicate that, relative to comparators, 1-year ED visits and 1-year hospitalizations (both per 1,000 beneficiaries) were higher for the treatment group after implementation of the LCCI intervention.

Exhibit LCCI.4: Difference-in-Differences Estimates for the LCCI Program

Variable	DID Estimator
Patients with 1-year Hospitalizations (Likelihood per 1,000 Beneficiaries)	83
Patients with 1-year ED Visits (Likelihood per 1,000 Beneficiaries)	73

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. Key limitations of the analysis are the small number of participants and that the results are unadjusted. In future reports we aim to present outcome measures for total cost of care and ACS admissions, which was not possible for this report due to incomplete data. As more participants

spend more time in the program, we will be able to present outcome measures beyond one year and use methods that are better suited to larger sample sizes (e.g., regression models). We also plan to incorporate Chronic Illness and Disability Payment Scores (CDPS) into our matching scheme to ensure that comparators are as similar as possible to LifeLong participants.

Summary

Claims-based Analysis. Our quantitative analysis of the LifeLong program shows an increase in patients with both hospitalizations and ED visits in the post-intervention period for LifeLong participants and results should be interpreted with caution for the reasons given above. In subsequent analyses we will couple our findings with a more thorough understanding from qualitative data on key factors related to program implementation to inform conclusions about the impact of LifeLong's program on utilization and cost.

Sustaining and Scaling the Complex Care Initiative. Plans are underway to sustain and to scale the LCCI. In the short-term, the program model will be modified to lower staffing costs by using a full-time or on-call peer counselor, rather than part-time assignments, and LifeLong expects to continue its longstanding partnership with intervention partner, the Center for Independent Living, to offer classes to enrollees. LifeLong has received a 6 month no-cost extension that will continue to support the full intervention, with additional funding for care coordination to be provided by the Alameda Alliance for Health (Medicaid managed care health plan and intervention partner); in addition, the awardee is considering possible integration of the LCCI into another HCIA-funded pilot with the Pacific Business Group on Health.

LifeLong and the Center for Independent Living see the potential to scale their program model through marketing of care management by RNs, peer counseling, and Living Well workshops to hospitals, managed care plans, clinics, and other providers delivering primary care for medically complex adults and operating within a capitated payer environment.

Data Collection and Analysis: Survey Development

NORC, in close consultation with LifeLong, developed and administered a telephone survey of LCCI participants to capture their experience with the program's main components: care coordination facilitated by a Nurse Care Manager, Peer Health Coach sessions, and Living Well Workshops. Questions focused on participant satisfaction, the effects of the intervention components on respondent's health, learned skills and goal setting/attainment, as well as demographics. The survey population was limited to participants who had an encounter with one of the LifeLong intervention arms in the previous 12 months. Among these participants, those whom LifeLong classified as actively enrolled were administered a more comprehensive version of the survey (Enrolled), while those participants whom LifeLong did not classify as actively enrolled in the past 12 months were administered an abbreviated version of the survey (Dis-enrolled). Surveys were administered in May and June 2015 by phone, and responses were collected on hardcopy instruments. In addition, the LifeLong surveys were available in English and Spanish, could be self-administered on paper (if requested), and could be completed with the help of a friend or family member (i.e., by proxy). Of the 122 LifeLong participants included in the sample, 75 participants or proxy respondents completed all or some of the survey. Following electronic data entry of the hardcopy

instrument responses and quality control checks on the data entered, NORC plans to review and analyze LifeLong survey results and report findings in our future reports to CMMI.

References

"Meeting the Needs of Frequent Users: Building Blocks for Success." Frequent Users of Health Services Initiative.

Summary Report of Evaluation Findings: A Dollars and Sense Strategy to Reducing Frequent Use of Hospital Services. Frequent Users of Health Services Initiative, 2008.

CMS Health Care Innovation Award Round One Eleventh Quarterly Reporting Period (11QR) January, February, March 2015. LifeLong Medical Care, 2015.

Eleventh Quarterly Reporting Period (11QR) January, February, March 2015. LifeLong Medical Care, 2015.

"Measurement and Monitoring Plan." edited by MM_1054_11QR_lifelong.xlsx: LifeLong Medical Care, 2015.

"Operational Plan." edited by OP_1054_11QR_LifeLong.xlsx: LifeLong Medical Care, 2015.

Stambaugh, Kathryn. *Quarter 11 HCIA Narrative Progress Report*. LifeLong Medical Care, 2015.

Stambough, Kathryn. "The LifeLong Complex Care Initiative: Promoting Independent Living in a Community Health Center." In *Health Care Innovation Award Summit*. Baltimore, MD, 2014.

Northland Healthcare Alliance

This chapter updates NORC's evaluation of the Northland Healthcare Alliance's Care Coordination for Seniors (NCCS) program. Northland's program adapts the Program of All-Inclusive Care for the Elderly (PACE) model to coordinate care and foster patient self-advocacy for seniors living in rural North Dakota, allowing this population to stay in their homes and still receive the services they need. The NCCS program targets Medicare and Medicaid beneficiaries who are at least 55 years of age who have at least one chronic condition, at least one non-elective hospitalization in the last year, more than one fall in the past three months, or who need assistance with one or more activities of daily living. The NCCS program was developed with the intention to lower costs, improve health care quality, and improve or maintain the health of elderly participants living in the community.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness, as well as findings from NORC's survey of participant experience.

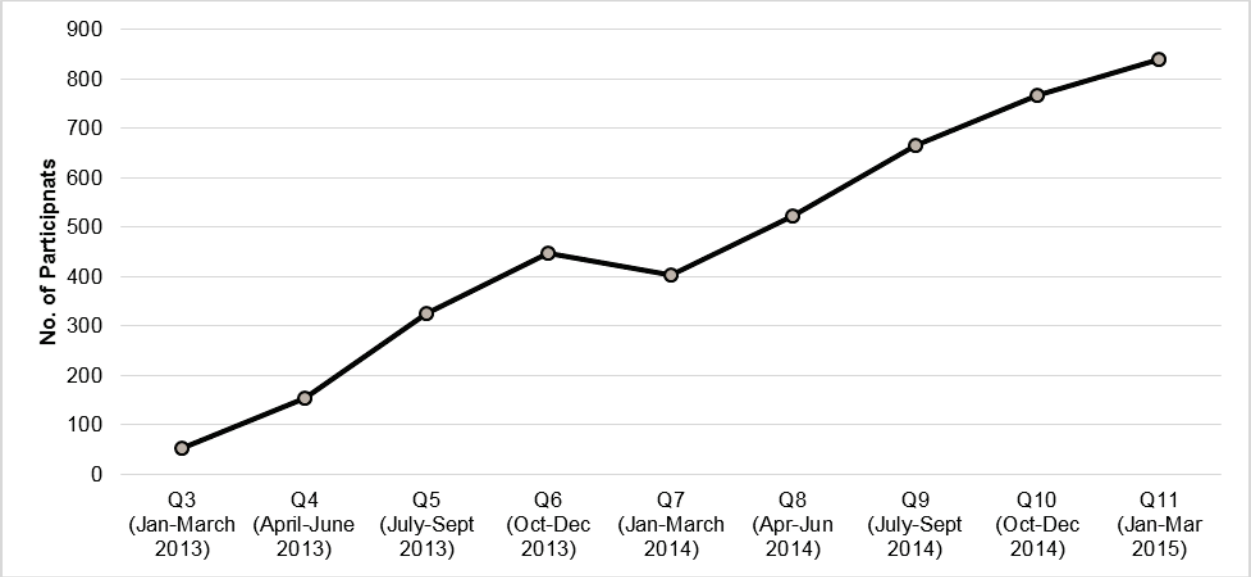
Overview of Awardee

CMMI Category for Awardee:	Integrated Health System
Funding Amount:	$2,726,216
Launch Date:	1/31/2013
State(s) Where Located:	North Dakota

Patients Targeted and Served

Self-reported data from Northland show participation by HCIA reporting quarter, as shown in Exhibit NHA.1, for both direct participants (those whose services are funded by the HCIA award) and those considered to be indirect participants (receiving services from staff trained or employed under the HCIA award but whose services are not directly funded by the award). The data show a steady increase over time, except for the seventh quarter, which occurred during winter months. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 839 patients, of which 692 were directly served by the intervention. As of March 31, 2015, the NCCS program had served a cumulative total of 809 unique participants since program launch, 93 percent of the total number projected to be served over the three years of the HCIA-funded program (870 participants).

Exhibit NHA.1: Total Number of NCCS Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Participants older than age 75 are the largest group (74 percent). Those ages 65 to 74 years are 19 percent of the total, and adults ages 26 to 64 years comprise 7 percent.
- Gender: Nearly two-thirds of enrolled participants are female (65 percent).
- Racial and Ethnic Identity: Nearly all participants are White (98 percent); American Indians/Alaska Natives constitute the remaining two percent.

Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), Northland has continued to successfully implement the NCCS program with the help of a strong workforce and its ongoing outreach to coordinate with other organizations to leverage resources synergistically. Despite difficulties in hiring new staff due to competition for jobs by the oil industry in North Dakota, the NCCS workforce (including community care coordinators (CCCs), an interdisciplinary team (IDT), a program director, and a marketing coordinator) has expanded to accommodate high enrollment across the seven sites (Linton was launched in addition to the original six—Bismarck/Mandan, Bowman, Ellendale, Dickinson, Hazen/Beulah/Center, Garrison). Staff turnover remains very low and the comradery and frequent communication of the care coordinators enhances the program. On NORC's second site visit, we were briefed on the restructured staff model, updates to health IT systems, care coordination, and Northland's plans for sustaining the NCCS program.

Notable updates in our understanding of the NCCS intervention are as follows:

Communications and Health IT. NCCS currently uses PACECare Online, an EHR, but plans to transition to ATHENA, which will house claims data, patient files, and assessments all in one place. Consolidating these files into one location will increase the CCCs' efficiency. In addition, NCCS has coordinated with a number of community agencies to increase the services available to program

participants. For example, NCCS collaborates with Interagency Program for Assistive Technology (IPAT), which provides adaptive equipment for free.

Patient and Caregiver Engagement. NCCS is an elective program that elders choose to participate in. The majority of participants are identified during transitional care, so the CCCs work with them to increase knowledge of their condition and participation in decision making with the aim that participants ultimately are able to manage their health. Through patient engagement, Northland hopes to achieve the overarching goal of the NCCS program, which is enabling elderly adults to safely remain living in the community.

Patient engagement starts upon enrollment in the program. Northland refers to individuals in the program as 'participants' to foster the mentality of engagement in the program as well as their health. Motivational interviewing, taught to the CCCs through the Kissito Collaborative Patient Care Pathway (CP2): Chronic Disease Self-Management Program, has been implemented in the NCCS program to increase patient education about their condition and increase active participation in the development and management of a health plan. CCCs delve beyond the basic queries about whether participants are taking their prescribed medication to identify any gaps in their understanding of their medication regimen. Additional questions addressing why the medication is being taken and why it is important to follow the regimen confirm that the participant is adequately prepared. This interaction between the participant and the CCC occurs monthly, at a minimum, during the home visit. If necessary, the CCCs are also available to speak with the participants on the phone.

The NCCS program utilizes two documents, *Managing My Health* and *My Communication Tool*, to maintain patient engagement with all participants. *Managing My Health* is a document that lists each participant's goals for the program. Establishing goals provides incentive for the participant and simultaneously allows the CCCs to measure the participant's success in the program. Participants write questions and/or concerns on the *My Communication Tool* to discuss with their physician during upcoming appointments. This form helps increase communication between the patient and the physician.

Northland created an IDT Assessment of Care Plan Progress metric to monitor progress on each participant's goals. Recent results of this measurement reported 57 percent of participants accomplished two of their three priority goals within a six-month time frame; the majority of participants who did not meet this criterion had ongoing or partially completed goals. Since this result was reported, Northland has established a care plan committee to increase consistency in the development of care plans across sites and the selection of realistic goals that can be addressed within this time period.

The CCCs interact with the participants to promote patient engagement. Introduced in the program's second year, CCCs receive formal training through the Kissito Collaborative Patient Care Pathway (CP2) course. This course assists CCCs to identify gaps in knowledge for participants with chronic diseases to promote self-management. The CP2 assessments were incorporated into the program's existing assessments. The 'Ask-Tell-Ask' method, based on the principle that education requires understanding and building on the patient's current knowledge, allows the participant's needs to be identified, while the Disease Awareness, Adherence Attitudes, Treatment Competencies, and Ability to Communicate with Healthcare Providers assessments help the CCCs evaluate the participant's self-management capabilities.

Fidelity, Adaptability, and Self-Monitoring. As noted above, despite a 6-month delay at the start of the intervention due to negotiations regarding key staff, Northland was able to get back on track and successfully implement the NCCS program. CCCs try to conduct a home visit with each participant once a month; sometimes they are unable to do this due to the number of participants. In the event that a CCC cannot visit the home, she will call to check up on the participant.

In the second year of the program Northland hired a marketing coordinator to lead the outreach to community organizations and providers and relieve the workload on the CCCs. The marketing coordinator provides a "face" for the program in the community so that CCCs can focus on the program participants. The above mentioned CP2 training was also implemented in the second year of the program. This training, especially the use of motivational interviewing, enables CCCs to identify what is most important to the participant and provides the necessary skills for the coordinators to ask the right questions in the appropriate manner. The NCCS program has experienced very low turnover since the implementation of this training.

Recently, Northland has restructured its staffing model to decrease expenses. The model now includes two levels of CCCs. A Community Care Coordinator II, either an RN or LSW, completes the initial home visit and assessments. If the participant's Patient Activation Measure (PAM) score is a 3 or 4, a Community Care Coordinator I, either a CNA, LPN, or MA, completes the remaining self-managing assessments and medication review. If a participant's PAM score is 1 or 2, the Community Care Coordinator II continues to monitor the participant until appropriate for a Community Care Coordinator I. According to Northland Healthcare Alliance's report to CMMI, Northland administers a TeamSTEPPS (T-TPQ) survey to measure satisfaction levels of the IDT members. In addition, staff retention and satisfaction are measured.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiaries participating in the NCCS program from January 31, 2013, through September 30, 2014. We use a comparison group of Medicare FFS beneficiaries in the same geographic areas as the NCCS service area. We find that the NCCS program shows statistically significant reductions in total cost of care, relative to a comparison group. We also observed decreases in utilization measures that were not statistically significant. In addition, we present initial results (demographic characteristics of Northland's patient population) from NORC's consumer experience survey.

Claims Based Analysis

Measures. Findings are presented for five quarterly measures:

- Hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries

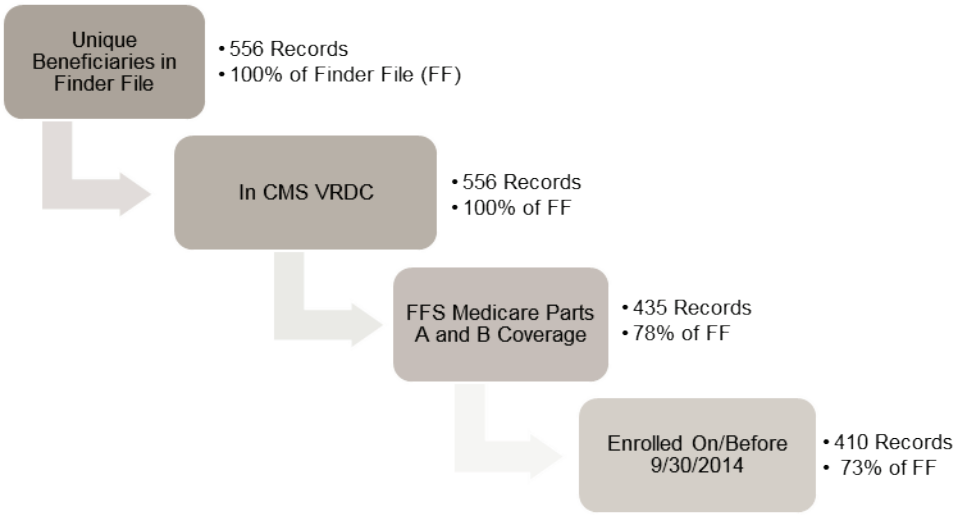
- 30-day readmissions per 1,000 beneficiaries
- Total quarterly cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

Research Question. For each measure, what is the difference in outcome between FFS Medicare beneficiaries enrolled in NCCS and those of the comparison group, after adjusting for differences in risk factors across both populations?

Analytic Approach. We specify and employ a set of DID models, comparing the experiences of participants in Northland's NCCS program with those of a comparison group in the pre- and post-intervention periods. Though the awardee's program targets all participants who meet the enrollment criteria, our analysis is limited to Medicare FFS beneficiaries, who comprise 82 percent of NCCS' targeted participants.[96]

Finder File and Creation of Analytic Sample. Northland provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[97] As shown in Exhibit NHA.2, the finder file identified 556 unique participants in NCCS. We matched all 556 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC). Of the 435 who were FFS Medicare beneficiaries during the month of program enrollment, 410 were enrolled before September 30, 2014. This constitutes our analytic sample of NCCS program participants in the post-intervention period.

Exhibit NHA.2: FFS Medicare Beneficiaries Identified through Northland Finder File



Comparison Group. The comparison group consists of non-institutionalized Medicare FFS beneficiaries in the same zip codes in North Dakota as the NCCS program participants. From the pool of potential

[96] Based on Northland's self-reported data to CMMI, as presented in HCIA 11QR Quarterly Report.

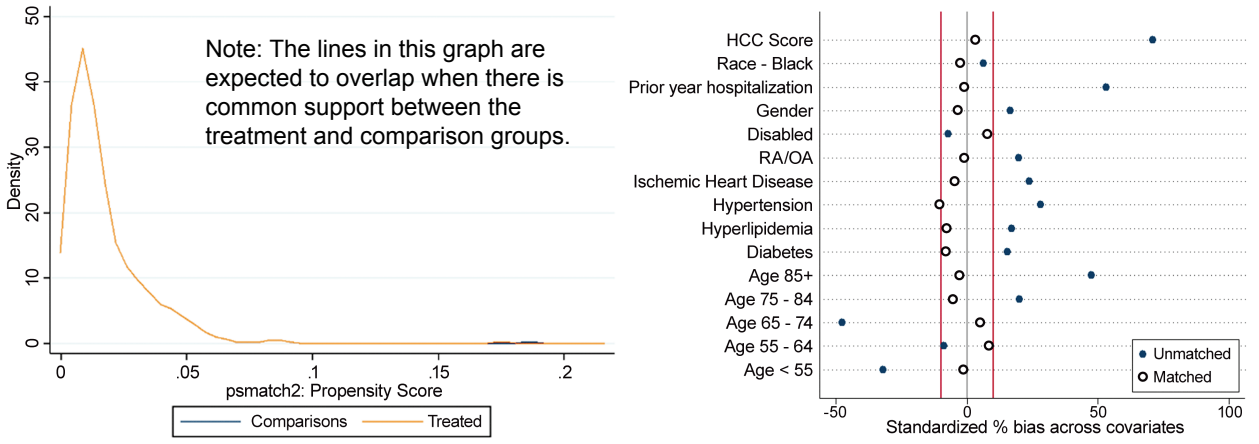
[97] In this report, we use Medicare claims through December 31, 2014. September 30, 2014, is the cut-off date for enrollment in the program to account for the 90-day claims runoff period.

comparison group members, a smaller matched sample is identified, all of whom have propensity scores similar to those of the Northland participants. To find suitable comparators for these participants, we use propensity score matching. For more detailed information on propensity score matching, please refer to Appendix C. The final propensity score model used includes age, race, gender, disability status, HCC score, prior year hospitalization and ED visits, and indicators for diabetes, hypertension, ischemic heart disease, and rheumatoid or osteoarthritis (RA/OA).

Exhibit NHA.3 presents common support and covariate balance across treatment and comparison groups.

- After matching, we observe nearly identical overlap in the density curves for propensity scores in the treatment (shown in red) and comparison (shown in blue) groups.
- In the matched sample, we are able to obtain balance on demographic covariates, comorbidities, and prior year utilization measures (hospitalizations and ED visits). While the measure of bias for hypertension was slightly outside of the acceptable range, the balance of this covariate is substantially improved after matching. Overall, the chart indicates that propensity score matching greatly improves the comparability of treatment and comparison groups.

Exhibit NHA.3: Test of Common Support and Covariate Balance



Analysis

Model. We compare the entire pre-intervention period and post-intervention periods in a DID analysis. We use population-averaged logistic models with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we use a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{ Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{ Implementation} + \beta_4 \text{ Patient}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect for each of four groups using combinations of β_1 (indicator for outcome in an Northland participant); β_2 (indicator for intervention implementation period); and β_3 (an interaction term enabling the estimation of the treatment effect during the post-implementation period).

Results

Descriptive Characteristics. Exhibit NHA.4 displays the descriptive characteristics of beneficiaries in the target and comparison groups before and after implementation of the intervention. We compare the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, and coverage reason). The majority of participants in both the NCCS and the comparison group are female, over 85 years old, and White. Both groups are very similar in total number of comorbidities and HCC score. Participants in NCCS have significantly higher total Medicare costs in the year before program enrollment than comparison participants ($p<0.05$), as well as more ED visits in the year before program enrollment ($p<0.10$).

Exhibit NHA.4: Descriptive Characteristics for the NCCS and Comparison Group Members

Variable	Northland	Comparison
No. of Persons	**401**	**401**
Mean Number of Quarters Enrolled [Range]	3.5 [1 - 7]	8.0 [1 - 9]
Gender % (N)		
Female	63.1 (253)	64.8 (260)
Age Group % (N)		
<55 years	0.7 (3)	1.0 (4)
55-64 years	3.7 (15)	2.0 (8)
65-74 years	21.2 (85)	19.0 (76)
75-84 years	38.7 (155)	41.1 (165)
≥85 years	35.7 (143)	36.9 (148)
Race/Ethnicity % (N)		
White	97.3 (390)	97.8 (392)
Black	0.0 (0)	0.2 (1)
Other	0.7 (3)	0.5 (2)
Dual Eligibility % (N)		
Dually Eligible	13.2 (53)	8.5 (34)
Coverage Reason % (N)		
Age	83.5 (335)	86.5 (347)
Disability	16.0 (64)	12.5 (50)
ESRD	0.2 (1)	0.2 (1)
Disability & ESRD	0.2 (1)	0.7 (3)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)	1.9 (1.3)	1.8 (1.4)
Mean Count of HCCs (SD)	2.8 (2.4)	2.8 (2.5)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Total Medicare Cost (SD)**	$17,138 ($23,316)	$12,283 ($19,074)
Hospitalizations per 1,000 (SD)	591.0 (931.3)	586.0 (918.3)
ACS Hospitalizations per 1,000 (SD)	149.6 (471.8)	124.7 (393.0)
30-Day Readmissions per 1,000 (SD)	84.8 (343.2)	82.3 (413.2)
ED Visits per 1,000 (SD)*	992.5 (1569.2)	832.9 (1447.2)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. In Exhibit NHA.5 we present the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference

in average outcome between the intervention and comparison groups *before* implementation of the intervention. This adjusted model assesses the impact of the awardee's program across the entire post-implementation period.[98]

The model-based estimates indicate the following about NCCS participants, relative to the comparison group:

- Utilization Measures: We observe non-significant decreases in hospitalizations and ED visits.
- Cost: We observe a statistically significant decrease of $1,338 per beneficiary for total cost of care.
- Quality of Care Measures: We observe a non-significant decrease in ACS hospitalizations and a slight, non-significant increase in 30-day readmissions.

Exhibit NHA.5: Difference-in-Differences Estimates for the NCCS Program

Variable	DID Estimate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	-8 [-36, 20]
ED Visits (Likelihood per 1,000 Beneficiaries)	-11 [-42, 20]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	2 [-10, 14]
Total Quarterly Cost of Care per Beneficiary ($)	**-$1,338 [-$2,755, $79]***
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	-6 [-21, 9]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This is a relatively small program (809 unique participants) with an analytic sample of roughly half that size. In subsequent analyses we plan to conduct a separate analysis for dually eligible Northland participants and expand our quantitative measures to include quality of care.

Survey of Consumer and Caregiver Experience

NORC collaborated with Northland to design the questionnaire and mode of administration for the survey of NCCS participants. The questionnaire measured different aspects of participant and/or informal caregiver experience with the NCCS program, including a strong focus on the care coordination that is central to the Northland intervention. See NHA.6 for a summary of domains and survey questions. Questions were drawn and modified from existing instruments found in the literature or publically available (e.g., the Home Health Consumer Assessment of Healthcare Providers and Systems – HH CAHPS, Patient Centered Medical Home CAHPS, American Community Survey, Caregiving in the U.S. (2009)), and from other consumer experience questionnaires that NORC developed, which allows for comparisons of results between awardees in the evaluation portfolio. We also included a number of questions unique to the Northland survey. A shorter survey was administered to NCCS participants who were no longer enrolled in the Northland program to elicit reasons for dis-enrollment.

[98] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, dual eligibility indicator, HCC score, and disability indicator.

Exhibit NHA.6: Summary of Northland Survey Instrument

Domains	Questions
Access to Health Care & Human Services	Do you talk with [Care Coordinator Name] as often as you need?
Participation & Experience with Care Coordination	[Care Coordinator Name] explains things in a way that is easy to understand.
Medication Management	Did you talk about the purpose for taking each of your medicines?
Relationship with Providers	And since enrolling in Northland, are you able to communicate better with your providers about your health?
Patient Autonomy, Self-Determination, Intervention Support for Patient Goals	[Care Coordinator Name] takes my opinions into account when creating the "Managing My Health" form. Do you strongly agree, agree, disagree, or strongly disagree?
Patient and Caregiver Satisfaction & Confidence in Care System	Overall, how satisfied are you with the Northland program?
Experience of Informal (unpaid family) Caregiver with Intervention	Has Northland Care Coordination for Seniors helped you to coordinate the care of [Participant Name] more easily?
Patient & caregiver activation	I have the information I need to make decisions about my own care and services
Functional status	Do you have serious difficulty either walking or climbing stairs?

The NCCS survey was administered by phone (CATI, Computer Assisted Telephone Interviewing) or paper (self-administered), though most participants completed the survey over the phone. This mixed-mode approach allowed Northland's population, comprised of older adults living at home, more flexibility in responding to the survey. Paper surveys were administered to a sub-set of participants whom the awardee had identified as unlikely to be able to complete a survey by phone (e.g., due to hearing loss), and to participants who requested a paper version of the survey after beginning the survey by phone. For those NCCS participants who were unable to complete the survey on their own (either by phone or paper), proxy respondents were encouraged to help the participant complete the survey or complete the survey on the participant's behalf. The survey was designed to capture any assistance provided by a proxy respondent (likely a family member or informal caregiver) and included a series of questions directed at the proxy to measure their own caregiving experiences with the NCCS participant.

Prior to data collection, the Northland survey was pilot tested with four NCCS program participants to gather feedback on the survey as a guide for final revision. Northland provided names and contact information for seven potential pilot test participants; three who were invited to participate did not respond or refused. Pilot participants were compensated $10 in cash for their time. The feedback received during pilot testing was used to improve the survey and prepare for administration in the following ways:

- Questions that were difficult for participants to grasp were subsequently modified so that text was more straightforward and instructive (e.g., a series of questions in which the prompt, or first part, of each question was the same and thus not read by interviewers each time, resulted in incomplete questions that caused confusion for respondents).
- Transition text was added between different types of questions to make expected response options clear to the respondent (e.g., when a "yes" or "no" is expected versus an agreement scale).
- Interviewer notes were added (e.g., clarifications read by interviewers to respondents on an "as-needed" basis, or describing what is meant by 'care at home').
- The estimated interview length of 15 minutes was confirmed.

- Received confirmation that participants had a basic understanding of terms that we expected them to know, such as "care coordinator" and the names of forms used by NCCS participants (e.g., "Managing My Health" form).

Overall, the pilot testing assured that the survey would be understood as expected and that administration would occur as intended.

In April 2015, Northland provided the names and contact information, as well as a sub-set of demographic information, for 815 participants. After review of participant information provided in the file, participants were excluded because they were deceased (n=65), were pretest respondents (n=4), or were missing contact information (n=3). Our final sample file included 743 NCCS participants. Data collection for the Northland survey began in May 2015. As of August 31, 2015, 351 interviews were completed by phone and 27 paper surveys were returned by mail. Phone interviewers will prompt a small sub-set of respondents who were recently mailed a second paper survey (after their first survey was returned undeliverable with a new forwarding address) to encourage them to return their completed surveys. This final survey effort may yield a few more completed surveys in August. In early September, data will be entered for all paper surveys and we will then merge these data with survey data collected by phone. We plan present a more robust analysis of the Northland participant survey in our Q8 report.

This report presents the demographic profiles of NCCS participants who completed the Northland survey by phone (n=352). Completed interviews were defined as those with answers to all questions in the survey. Data were reviewed for completeness and to identify missing, invalid, inconsistent skip errors, or out-of-range values.

Results

Exhibit NHA.7 presents demographic and other information about NCCS participants who responded to the phone survey. The distribution of enrolled (78 percent) to dis-enrolled (22 percent) survey respondents is similar to that in our sample file; about 75 percent of the sample is currently enrolled in the NCCS program and about 25 percent of the sample is no longer enrolled in the program. Most respondents (69 percent) are female, and most are at least 75 years old (74 percent). Almost all respondents (97 percent) identify as White, with about 2 percent identifying as American Indian or Alaska Native. The sample is educated, with 58 percent having at least a high school education and 30 percent having at least some college. Most NCCS respondents live alone (40 percent), with another 31 percent living with a spouse or partner. Of those providing an annual household income (n=263), 72 percent earn less than $24,999 and only 7 percent earning $50,000 or more.

Exhibit NHA.7: Demographic Characteristics of NCCS Survey Respondents

Variable	Value
Number of Respondents	**352**
Enrollment Status in NCCS Program % (N)	
Enrolled	78.1 (275)
Dis-enrolled	21.9 (77)
Gender % (N)	
Male	31.5 (111)
Female	68.5 (241)
Age Group % (N)	
30-54 years	0.3 (1)
55-64 years	5.7 (20)
65-74 years	19.0 (67)
≥75 years	74.4 (262)
Race % (N)	
White	96.6 (340)
Black or African American	0.3 (1)
American Indian or Alaska Native	1.7 (6)
Other	0.3 (1)
Highest Level of Education % (N)	
Less Than High School	19.9 (70)
High School or GED	28.1 (99)
Some College or Less Than 4-Year Degree	23.0 (81)
College Graduate or 4-Year Degree	4.0 (14)
Post-Graduate Work or Advanced Degree	2.8 (10)
Refused	0.3 (1)
Current Living Situation % (N)	
Living alone	40.1 (141)
Living with spouse/partner	31.0 (109)
Living with family	5.1 (18)
Other	2.0 (7)
Annual Household Income % (N)	
Less than $15,000	21.3 (75)
$15,000 - $24,999	16.5 (58)
$25,000 - $34,999	6.8 (24)
$35,000 - $49,999	4.8 (17)
$50,000 or greater	3.4 (12)
Don't Know	14.8 (52)
Refused	10.5 (37)

NOTES: [1]Race and birth year were provided by Northland and were missing for a small number of cases (4 records were missing Race and 2 records were missing birth year). [2]Not asked of dis-enrolled participants (n=77).

In our initial review of the demographic characteristics of NCCS phone survey participants, we find the sample to be representative of the population Northland serves. Like the NCCS population, most survey respondents are female, 75 years or older, and identify as White (with a small number identifying as American Indian or Alaska Native). While we have not yet integrated data from the paper version of the NCCS survey, given the small number administered, we do not expect this respondent profile to change significantly.

Summary

Claims-based Analysis. Our quantitative analysis of the NCCS program shows statistically significant reductions in total quarterly cost of care, as well as early trends for reduced utilization relative to a comparison group. In our review of the demographic data from the NCCS participant survey, we find that the profile of respondents is similar to the NCCS target population, which strengthens our confidence that findings will also be representative of program participants as a group.

Consumer and Caregiver Experience Survey. In future reports, we plan to analyze the complete set of NCCS survey data across both modes (phone and paper) and describe respondent experiences for both currently enrolled and dis-enrolled NCCS participants, as well as for proxy respondents.

Sustaining and Scaling the Care Coordination for Seniors Program. The awardee has received a no-cost extension (NCE) and plans to sustain the full intervention. The NCE extends funding for an additional 12 months, but this amounts to less than 50 percent of the program's operating budget. Northland has also been approved to become a Medicaid provider for a small proportion of participants who are Medicaid only (not dually eligible or covered under ACA expansion) beginning in December 2015. Northland is actively pursuing multiple grants to ensure sustainability beyond the funding period, including applying for a Care Coordination grant through the Office of Rural Health Policy, DHHS (ORHP). If awarded this grant, funding will begin in late 2015 and will augment funds to continue the provision of care coordination services in rural communities. Northland also plans to apply for a Pay for Success grant, which provides matching funds of up to $200,000. Northland has applied for this grant in the past and is using the feedback from the previous application in their new submission. Despite the uncertainty of sustained funding, the Northland leadership and staff remain invested in the program and are not seeking other job prospects.

Northland has no plans to scale up the intervention. The demand for expanding this program is present and the structured CP2 training would provide consistent delivery of service across sites; difficulty finding staff is the limiting factor. Northland is hoping to be funded through a Medicare ACO or Medicaid plan that includes dually eligible beneficiaries and those covered under Medicaid expansion. The model could also be adapted to a Clinically Integrated Network to use with different populations (e.g., pediatric, special needs), modifying assessment protocol.

References

"Care Coordination Eligibility Requrements." 1: Northland Health Alliance, 2014.

Care Coordination for Seniors: Northland. Northland Health Alliance, 2014.

"Meeting Effectiveness Inventory." 1-3: Northland Health Alliance, 2014.

"Northland Care Coordination for Seniors." In *Counsumer Assessment of Healthcare providers and Systems (CAHPS)*: Northland Health Alliance, 2014.

"Patient Health Questionnaire (Phq-9)." 1-2: Northland Health Alliance, 2014.

"Steering Committee: Coalition Effectiveness Inventory." 1-10: Northland Health Alliance, 2014.

"Teamwork Perceptions Questionnaire." 1: Northland Health Alliance, 2014.

"The Veterans Rand 12-Item Health Survey (Vr-12)." Northland Health Alliance, 2014.

11QR Quarterly Awardee Performance Report: Northland Healthcare Alliance. The Lewin Group, 2015.

"CCC Staffing Model." 1: Northland Health Alliance, 2015.

Northland Care Coordination for Seniors: Business Plan Outline and Description of Services. Northland Health Alliance, 2015.

"Northland Care Coordination Payment Model." 1-4: Northland Health Alliance, 2015.

Northland Care Coordination: Initial Evaluation of Total Costs from Available Claims Data. Northland Health Alliance, 2015.

Q10 Supplemental Documentation: Northland Health Alliance. Northland Health Alliance, 2015.

Q11 HCIA Narrative Progress Report: Northland Healthcare Alliance. Northland Health Alliance, 2015.

Q11 Supplemental Documentation: Northland Health Alliance. Northland Health Alliance, 2015.

Palliative Care Consultants of Santa Barbara

This chapter updates NORC's evaluation of the Palliative Care Consultants of Santa Barbara (PCCSB) Doctors Assisting Seniors at Home (DASH) program. PCCSB is a four physician outpatient practice that serves patients and their caregivers in the Santa Barbara region. DASH has been created and launched with HCIA support, to address a need for alternatives to hospital emergency department visits for patients ages 60 and older who are considered frail, would like to remain at home, and live within a 12 mile radius of Santa Barbara, CA. DASH uses home-based triage and care coordination by experienced registered nurses and follow-up by physicians with experience in primary care, urgent care, and palliative medicine. This rapid response to a patient's call for assistance can sidestep the need to call 911. Patients enroll in DASH in advance of calling for a home visit. As part of enrollment, they participate in advanced care planning, receive referrals for needed community benefits and social supports, and confirm a connection with a primary care provider.

We provide an update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

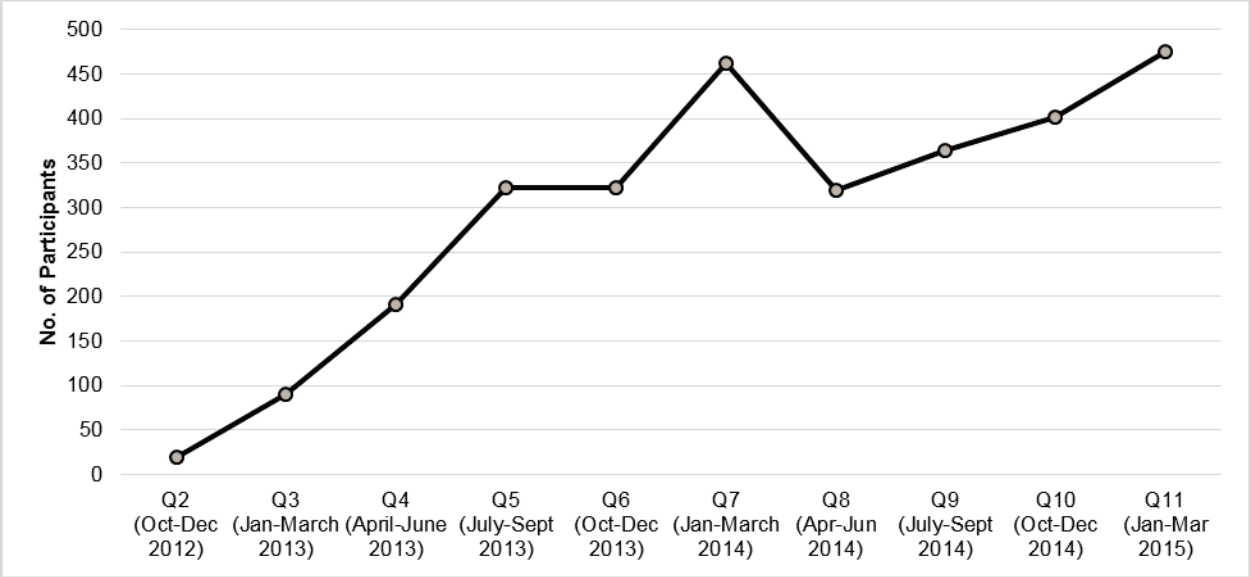
Overview of Awardee

CMMI Category for Awardee:	Physician
Funding Amount:	$4,254,615
Launch Date:	12/13/2012
State(s) Where Located:	California

Patients Targeted and Served

Self-reported data from DASH provides enrollment data by HCIA quarter, as shown in Exhibit PCCSB.1. Enrollment peaked in Q7, and in Q11 exceeded that earlier high point. During the most recent quarter for which data are available (January 1 through March 31, 2015), DASH served 476 patients. As of March 31, 2015, DASH had served a cumulative total of 1,311 unique participants since program launch, 87 percent of the total number projected to be served over the three years of the HCIA-funded program (1,500 participants).

Exhibit PCCSB.1: Total Number of PCCSB Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: About four-fifths of participants are older than 75 years (80 percent), with 18 percent 65 to 74 years of age and two percent ages 26 through 64 years.
- Gender: About 70 percent of enrollees are female.
- Racial and Ethnic Identity: Most enrollees are White (90 percent) and seven percent Hispanic or Latino.

Update: Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), PCCSB has continued full implementation of the DASH model, with some changes in targeting and staffing intended to move the intervention toward sustainability in the future, when a local market shift toward capitation is anticipated. Over the three years, there has been a shift toward upskilling of rapid response triage staff, from initial plans to use medical assistants to the decision to launch using RNs, to the gradual integration of nurse practitioners and greater reliance on physicians for the home visits. In the past year, targeting has focused more narrowly on persons recently discharged from the ED and hospital, despite the lack of data-sharing with Santa Barbara's hospital. The awardee notes the benefits of being a small, autonomous organization, rather than being affiliated with an integrated health system, for maintaining fidelity to the DASH program model, while noting the disadvantages in lack of access to targeting and monitoring data that come with not being part of an integrated health system.

Communications and Health IT. PCCSB has a dedicated health IT platform for the DASH project, and home visit staff use cell phones and laptops to communicate with the on-call physician and with each other. However, PCCSB does not have access to hospital or clinic EHRs, so that notes from home visits and follow up are faxed to the primary care provider, and targeting of prospective enrollees based on

hospital discharge is not readily feasible. PCCSB cites access to data as one of its biggest implementation challenges.

Patient and Caregiver Engagement. DASH combines patient engagement and support to caregivers with care coordination, delivered episodically to enrolled participants in response to a call from the enrollee or a caregiver. The goals of the program are to offer rapid response (within one hour for a nurse, within six hours for a physician) for 12 hours a day, seven days a week that reduces inappropriate use of the hospital ED by strengthening the link to primary care.

DASH has one staff member who conducts outreach and who enrolls all participants, a team of eight to 10 registered nurses and two nurse practitioners who make home visits (rapid responders), and one or more on-call physicians who advise the rapid responders as well as make follow-up home visits. The enrollment appointment is a focal point for engagement; it includes the taking of a health history, an assessment of patient and caregiver needs, a review of medications, coaching on advanced care planning and completion of a POLST, creation of one or more care goals, the confirming of a connection with primary care (required in order to be eligible for DASH), and referrals to community services and benefits.

Participants initiate a DASH encounter by calling PCCSB to request a rapid response visit. During the home visit, the nurse meets with the enrollee and his or her caregiver, to triage the situation that spurred the call to DASH, review the enrollee's medications, answer questions and offer coaching related to chronic disease self-management and prevention, consult by telephone with the on-call physician, deliver home health services as needed (e.g., wound care), advise on appropriate next steps (e.g., visit to specialist or to primary care), and prepare a clinical note to be shared with the enrollee's primary care provider. For about 20 percent of the rapid response visits, a physician will make a follow up home visit. In addition, rapid response nurses make additional calls to an enrollee and caregiver after the visit, to coach on preparation for a doctor's appointment or other issues raised during the rapid response visit.

The rapid response team is trained informally and experientially. DASH relies on the backgrounds of the staff that they hire—typically many years of experience that span both clinical settings for elders (e.g., adult day care, hospital, long-term care) and community-level nursing that builds skill in teaching, coaching, and project management. New hires accompany more senior staff on home visits and gradually move from shadowed assignments to independence in responding to participant calls. PCCSB holds weekly case reviews that include short lectures on topics suggested by the team.

PCCSB assesses the impact of patient engagement and caregiver support in multiple ways, including a participant satisfaction survey mailed 4 weeks after a rapid response visit. Relevant measures include enrollee behavior change (e.g., completion of a POLST) and satisfaction (e.g., survey questions based on CAHPS and satisfaction with response time to call, explanation of care choices, helpfulness of post response referrals). "DASH is on top of things –suggesting next steps –other places, you have to wait and ask –also –the nurse was really caring. Started off with a thorough exam –like a physician –took her time –very uplifting experience."

During NORC's site visit (spring 2014), we convened two focus groups with participants and caregivers. Respondents gave strong praise to the DASH program for providing effective coaching on how to manage symptoms and navigate the health care system, adding a sense of security and self-confidence that a stressful visit to the hospital ED could be prevented and the quality of health and wellbeing improved. "In my culture, hard to talk about death and dying. My brothers and me were not sure how to talk about it. When translating what [the DASH social worker and enrollment staff] was saying, everything was so calm and easy, language was not a barrier. It was so easy, so natural, we were amazed."

Fidelity, Adaptability, and Self-Monitoring. As noted above, PCCSB has modified its program model since launch, adapting less in response to local market conditions, which have been relatively stable, and more in response to feedback from providers and staff involved in implementation and referrals, as well as the many informal partners at assisted and independent living residences in Santa Barbara. Self-monitoring includes metrics related to the characteristics, efficiency, and experience of the rapid response visits, as well as CAHPS surveys of patient satisfaction, queried at baseline and annually, on a rolling basis.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiaries enrolled in DASH from January 1, 2013, through December 31, 2014. We use a comparison group of Medicare FFS beneficiaries, identified through the CMS Virtual Research Data Center (VRDC), living in nearby locations who are demographically similar and have comparable prior year utilization. We find the program has significantly reduced ED visits, relative to a comparison group, for DASH participants. The DASH program does not show any other statistically significant changes in health care utilization or total cost of care, relative to the comparison group, although some estimates are trending in the direction of reduced utilization.

Measures. Findings are presented for five core measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total Medicare cost per quarter per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

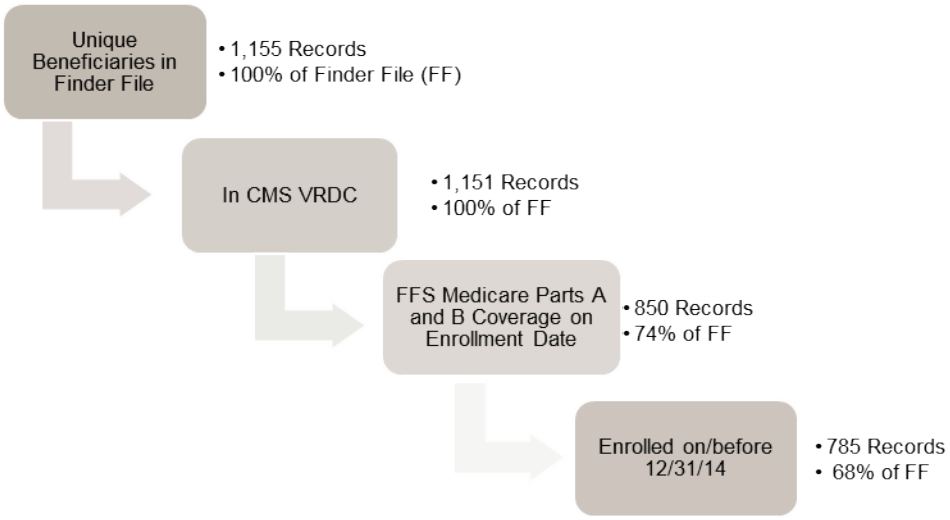
Research Question. For each measure, what is the difference in outcome between beneficiaries enrolled in DASH and those of the comparison group, after adjusting for differences in risk factors across both populations?

Analytic Approach. We specify and employ a set of DID models, comparing the experiences of participants in PCCSB's DASH program with those of a comparison group in the pre- and post-intervention periods. Though the awardee's program targets all participants who meet the enrollment

criteria, our analysis is limited to Medicare FFS beneficiaries, who comprise 66 percent of DASH's targeted population.

Finder File and Creation of Analytic Sample. For our analysis, PCCSB provided a finder file of program participants and their enrollment dates, enabling us to pull claims for Medicare and Medicaid beneficiaries and calculate outcome measures.[99] As shown in Exhibit PCCSB.2, the finder file identifies 1,155 unique participants in DASH. We have been able to match 1,151 of these individuals to Medicare beneficiary identifiers in the VRDC, and 850 of these were FFS Medicare beneficiaries during the month of program enrollment. Our final analytic sample includes 785 individuals who were enrolled in the program on or before December 31, 2014.

Exhibit PCCSB.2: FFS Medicare Patients Identified Through PCCSB Finder File



Comparison Group. We use Medicare data obtained from the VRDC to identify a pool of beneficiaries living in a similar geographic location as the treatment group and who meet similar eligibility criteria. We identified non-institutionalized Medicare beneficiaries enrolled in a FFS plan in calendar year 2013 who reside in Ventura County California. Additionally, we specified that the comparison population have one or more chronic conditions as defined by the hierarchical condition category (HCC) risk score. This pool of potential comparators numbers 77,018 beneficiaries.

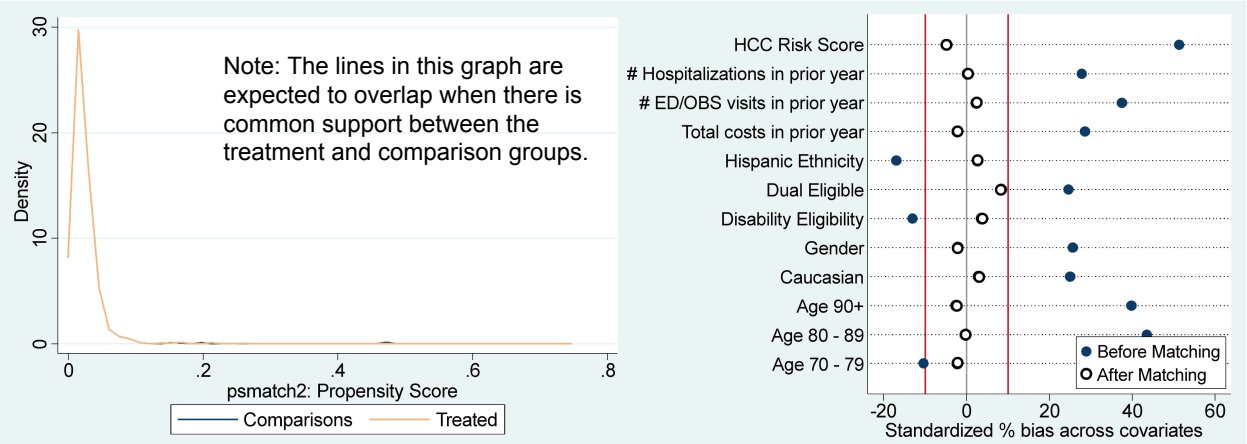
From this larger sampling frame, we identify a smaller comparison group, using propensity score matching. For more details on comparison selection and propensity score matching, see Appendix C.

[99] Medicare claims are available through March 31, 2014, for the analysis in this report.

Exhibit PCCSB.3 presents common support and balance in covariates across treatment and comparison groups.

- After matching, we observe nearly identical overlap in the density curves for propensity score in the treatment (shown in red) and comparison (shown in blue) groups, indicating equivalent propensity scores in both groups.
- In the matched sample we are able to attain balance in measures of age, race, ethnicity, gender, dual eligibility, and health care utilization in the year prior to enrollment.

Exhibit PCCSB.3: Test of Common Support and Covariate Balance



Analysis

Model. We model dichotomous outcomes of inpatient admission and ED visits using population-averaged logistic regression models. Total cost of care is modeled as a continuous variable using a generalized estimating equations (GEE) model with a gamma distribution and log link. The enrollment date for the treatment population is set as their enrollment date into the DASH program and, for the comparison group, the date of enrollment is set as January 1, 2013. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Results

Descriptive Characteristics. Exhibit PCCSB.4 displays the descriptive characteristics of beneficiaries for the intervention and comparison groups before and after implementation of the intervention. We compare the post-intervention period for the two groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before enrollment) or a chi-square test for categorical parameters (age, race,

ethnicity, coverage reason). In the post-intervention period (January 2013 through December 2014), there are 785 beneficiaries in the treatment group and 785 in the comparison group.

Of the 785 participants in our analytic file enrolled for at least one quarter in DASH, just over half were enrolled for four quarters (57 percent), with the longest enrollment being nine quarters. The majority of the participants are female (67 percent) and White (90 percent). About one-third of participants are dually enrolled in Medicare and Medicaid (32 percent) and 84 percent gained Medicare coverage at age 65.

Exhibit PCCSB.4: Descriptive Characteristics for the DASH and Comparison Group Beneficiaries

Variable	PCCSB	Comparison
Number of Beneficiaries	785	785
Age % (N)		
<70 years	13.9 (109)	12.0 (94)
70-79 years	30.5 (239)	31.5 (247)
80-89 years	38.6 (303)	38.7 (304)
≥90 years	17.1 (134)	17.8 (140)
Race/Ethnicity % (N)		
White	90.2 (708)	89.2 (700)
Hispanic	4.2 (33)	3.6 (28)
Gender % (N)		
Female	67.0 (526)	68.0 (534)
Dual Eligibility % (N)		
Dually eligible	32.2 (253)	28.5 (224)
Medicare Eligibility/Risk Adjustment % (N)		
Age	84.3 (662)	85.5 (671)
Disability	15.7 (123)	14.3 (112)
ESRD	0.1 (1)	0.5 (4)
Total Community HCC	1.63 (1.27)	1.69 (1.42)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Hospitalizations per 1,000 (Standard Deviation)	439 (925)	437 (892)
ED Visits per 1,000 (SD)	890 (1722)	856 (2680)
Total Medicare Cost (SD)	$15,213 ($23,532)	$15,702 ($30,619)
No. of Days FFS (SD)	360 (35)	363 (26)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. Exhibit PCCSB.5 presents the difference in average outcomes between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcomes between the intervention and comparison groups *before* implementation of the intervention. Our model assesses the impact of the awardee's program across the entire post-implementation period. The estimates presented are unadjusted because we are able to attain balance in covariates between the treatment and comparison groups through propensity score matching.

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: The DASH program is associated with a significant reduction in ED visits (37 fewer participants with an ED visit per 1,000 beneficiaries). The DASH program was not associated with a reduction in hospitalizations.
- Cost: The DASH program is not associated with a reduction in total quarterly cost of care.
- Quality of Care Measures: The DASH program is not associated with a reduction in readmissions or ACS hospitalizations.

Exhibit PCCSB.5: Difference-in-Differences Estimates for the DASH Program

Variable	DID Estimate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	-0.5 [-16.4, 15.4]
ED Visits (Likelihood per 1,000 Beneficiaries)	**-37.2 [-55.9, -18.6]*****
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	3.2 [-3.8, 10.1]
Total Cost of Care per Quarter per Beneficiary ($)	$28.1 [-$756, $813]
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	-1.4 [-8.6, 5.8]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis reflects a relatively short intervention period, with just half of the program participants in the analytic sample in the program for one year. In future reports, we plan to extend the follow-up period and add new quality of care measures.

Summary

Claims-based Analysis. Our quantitative analysis of the DASH program shows a significant reduction in ED visits, relative to a comparison group, achieving the core objective of DASH. We see no other notable changes in other health care utilization measures or total cost of care.

Sustaining and Scaling the DASH Program. Since launch, the awardee has tested multiple avenues of financial support, including a sliding scale (tiered) fee for consumers that has met with limited success and subsidies from senior housing buildings and continuing care residences that have been partners in facilitating DASH enrollment for their residents. In addition, PCCSB has received a 12 month no-cost extension of their HCIA 1 funding.

There are no plans to replicate or scale DASH beyond its current operations in the city of Santa Barbara, where the awardee, a palliative care outpatient practice, has successfully leveraged its existing relationships in the community and its clinical team. PCCSB has been modifying staff roles, to shift rapid response triage roles from RNs to nurse practitioners and physicians, in order to address the medical complexity of enrollees with greater confidence. The staffing change also enables Medicare and Medicaid billing for triage home visits. With the use of NPs and MDs for home visits, PCCSB is in a position to serve in the future as a subcontractor to a local Medi-Cal (Medicaid) provider, providing care management to dually eligible residents, a shift from their earlier focus on Medicare Fee-For-Service beneficiaries. At present, plans for an accountable care organization in the Santa Barbara health care market are in formation.

Data Collection and Analysis: Survey Development

NORC and PCCSB worked together to review and refine multiple drafts of the NORC-administered DASH patient survey, finalizing the instrument in May 2015. The questionnaire focuses on the DASH enrollment process, opinions about different aspects of DASH, the most helpful part of the program to patients, and the perceived value of DASH given the program's cost to patients. The survey is designed as a self-administered paper survey, with English and Spanish versions, and can be completed with the help of a friend or family member (i.e., proxy). Data collection began in June 2015 and is expected to continue through mid-September 2015. NORC mailed questionnaires to all patients who enrolled in the DASH program (1,080 as of May 2015), as well as 190 patients who had dis-enrolled from the program. As of August 31, 2015, 363 DASH surveys had been returned to NORC. In mid-August 2015, a postcard reminder was sent to DASH patients who had not yet returned a survey to encourage their participation. Data collection will continue through mid-September to allow sufficient time for surveys to be returned following the postcard prompting.

References

DASH (Doctors Assisting Seniors at Home): Narrative Progress Report. Palliative Care Consultants of Santa Barbara, 2015.

Eleventh Quarterly Reporting Period (11QR) January, February, March 2015. Palliative Care Consultants of Santa Barbara, 2015.

Judith Dwyer, Terri Jackson. *Literature Review: Integrated Bed and Paitent Managment*. Patient Managment Task Force: Departmetn of Human Services Victoria, 2001.

Sarah J. Crane, Ericka E. Tung. Gregory J. Hanson, Stephen Cha, Rajeev Chaudhy, Paul Y. Takahashi. "Use of an Electronic Adminstrative Datebase to Identify Older Community Dwelling Adults at High-Risk for Hospitalization or Emergency Department Visits: The Elders Risk Assessment Index." *BMC Health Services Research* 10, no. 338 (2010): 7.

Pittsburgh Regional Health Initiative

This chapter updates NORC's evaluation of the Primary Care Resource Center (PCRC) program, sponsored by Pittsburgh Regional Health Initiative (PRHI). The PCRC program provides intensive coordination and disease management for patients by way of care management, provider and patient education, and patient activation, sited at each of six participating community hospitals.[100] The initiative is targeted to patients leaving the hospital with one of three diagnoses: chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), and acute myocardial infarction (AMI). The PCRC program provides pre- and post-discharge care coordination for patients at high risk for re-hospitalization from the three targeted conditions. The HCIA award builds on previous work building a prototype PCRC at Monongahela Valley Hospital in Monongahela, PA. Based on the prototype, PRHI established six PCRCs in regional community hospitals in Western Pennsylvania and the West Virginia Panhandle. Each hospital-based PCRC is implemented by a team of nurse care managers and pharmacists and delivers inpatient services and home visits, as well as establishes telephone contact with patients and their primary care providers, organized around the rubric of six key tasks ("Perfect Discharge Bundle"); these tasks include a root cause analysis of hospital admission, patient education, pharmacist medication review, creation of a discharge action plan, and both a pharmacist call and a note to the patient's physician within 72 hours of discharge.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness, as well as findings from NORC's survey of workforce and training experience.

Overview of Awardee

CMMI Category for Awardee:	Other-Regional Health Improvement
Funding Amount:	$10,419,511
Launch Date:	7/1/2013
State(s) Where Located:	Pennsylvania, West Virginia

Patients Targeted and Served

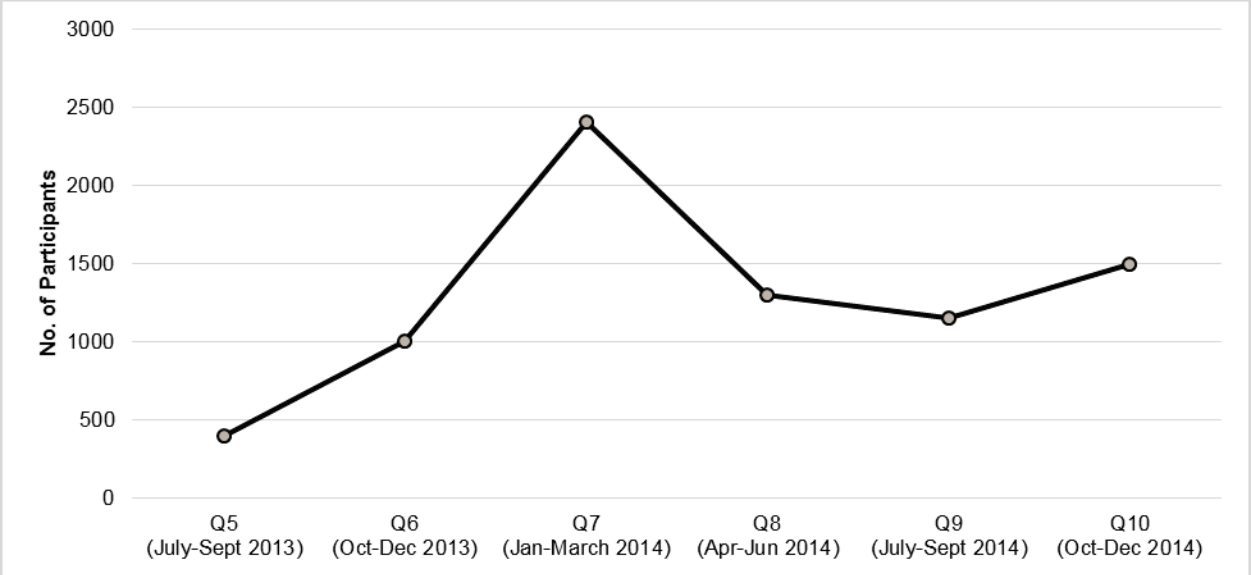
Self-reported data from PRHI provides participation data by HCIA reporting quarter, as shown in Exhibit PRHI.1. Implementation of the PCRC program was delayed, with the first quarter of data available being for HCIA Quarter 5. The data show a rapid increase through Q7, followed by a decrease through Q9 and a slight increase in Q10. During the most recent quarter for which data are available (October 1 through December 31, 2014), the program served 1,502 participants.[101] As of December 31, 2014, PRHI had served a cumulative total of 5,385 unique participants—from all payers—since program launch, 67

[100] The original six PCRC hospitals are Indiana Regional Medical Center (Indiana, PA); Butler Memorial Hospital (Butler, PA); Conemaugh Memorial Medical Center (Johnstown, PA); Uniontown Hospital (Uniontown, PA); Sharon Regional Health System Main Hospital (Sharon, PA) which serves a substantial number of patients from nearby towns in Ohio; and Wheeling Hospital (Wheeling, WV). The PCRC at Uniontown Hospital closed as of January 31, 2015. This report is based on data and program information that includes all six original PCRCs.

[101] The awardee has noted that there is a 3-month lag in reporting program enrollment numbers; therefore, the awardee's QR11 report to Lewin includes data on program experience and participants during QR10.

percent of the total number projected to be served over the three years of the HCIA-funded program (8,000 participants).

Exhibit PRHI.1: Total Number of PRHI Participants, by HCIA Quarter



For the group of participants enrolled during the period from October 1 through December 31, 2014:

- Age Cohort: One-quarter of participants are adults ages 26 through 64 (25 percent), 30 percent are between ages 65 and 74 years and 46 percent are 75 years of age and older.
- Gender: Half of the participants are female (50 percent).
- Racial and Ethnic Identity: Nearly all of the participants are identified as White (97 percent) and three percent as Black or African American.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit (June 2014) and our first annual report (September 2014), PRHI has continued to support and oversee the Primary Care Resource Center (PCRC) program implemented in the remaining five hospital sites after the Uniontown site left the program. PRHI worked with leadership at the five PCRC sites to develop a budget and transition plan to end funding to all five sites as of October 31, 2015. PCRC sites stopped enrolling new patients the end of September so that they could be fully staffed and able to track 30-day readmissions while they transition the PCRCs to other sources of funding or organizational arrangements. The PRHI team will keep limited staff through February, 2016 to study the PCRCs and track their transition (e.g. move to payment reform or alternative contracting). As of May 2015, two sites, Conemaugh and Wheeling, had plans to continue and had already put the PCRC program into their 2015-2016 budgets and have every intention of continuing the effort after HCIA funding ends.

Notable updates in our understanding of the PCRC intervention are as follows:

Communications and Health IT. PCRC teams have a "huddle" at the beginning of each day to discuss the current patients and follow up phone calls and home visits that staff will conduct that day, as well as reviewing any new inpatients that staff should follow up with at the hospital. PCRC staff also communicate with primary care practice clinicians and office personnel about patient status and pending needs.

Patient and Caregiver Engagement. Key components of PRHI's patient engagement efforts include motivational interviewing, patient education, and disease self-management. Through their patient engagement activities, PCRC staff aim to improve the knowledge and activation for self-care of patients discharged from the hospital with three prevalent (and often co-occurring) chronic diseases. PCRC staff are trained in motivational interviewing and encouraged to "meet patients where they are."

PCRC staff, nurses who serve as care managers and pharmacists, are trained to listen to patients and understand how important certain behavior changes are to the patient and how to help them prioritize their goals. For example, care managers might ask patients to rate how important quitting smoking is for them on a scale of 1-10, which provides the PCRC staff with a sense of the patients' priorities and willingness to change their behavior. In addition, care managers keep the focus on the patients' goals, such as cutting back on smoking versus quitting completely, even if the care managers would prefer the patient quit smoking altogether. This approach also encourages patients to acknowledge their progress and manage their conditions more effectively. PCRC staff report that they are gaining confidence in using motivational interviewing techniques and are seeing their benefits. One staff member reflected that they have learned "what a big win the small wins can be."

Patient education is another key component of PCRC's patient engagement activities. A strength of the PCRC program is that patient education is available in different settings and through different media. Care managers can provide education while conducting a home visit or on site at the PCRC. The PCRC pharmacist reviews medications with each patient and develops a medication list that describes how much and how often patients take each of their medications.

Fidelity, Adaptability, and Self-Monitoring. PRHI approached the establishment of PCRCs on hospital campuses with the philosophy that if a service, such as nutritional education for cardiac patients, was already available on site, the PCRC would coordinate with the existing service rather than duplicate it. Thus the model was adapted to take account of local resources and operations. PRHI also reflected on their early patient recruitment experience to enroll patients more effectively. Initially a relatively high proportion of patients declined to participate in the program, so that PCRC staff modified how they presented the PCRC to patients. Because the PCRC is a part of the hospital, staff learned to describe the program as an integral component of hospital services, rather than as something apart from their care. Nurses were guided on how to use motivational interviewing techniques to encourage patients to participate. PRHI also worked with PCRCs to retool their discharge summary documentation to be easier for the next provider in the clinic or staff at a skilled nursing facility to read and absorb critical information.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiary-episodes at PRHI's PCRC program from July 1, 2013, through September 30, 2014. We use a comparison group of FFS Medicare beneficiaries discharged with the same qualifying diagnoses from ten community hospitals in the same geographic region and with a similar scope of services as the intervention hospitals. We find that, following hospital discharge, the PCRC program significantly increased follow-up visits with a practitioner (PV) for its beneficiary-episodes, relative to episodes from comparison hospitals. We also find that the PCRC program lowered emergency department visits and total cost of care within 90 days of hospital discharge, but these results did not reach statistical significance.

In addition, we present an initial analysis of workforce experiences with the PRHI intervention, from NORC's workforce survey, which included site-specific questions requested by PRHI. We find that staff report overall satisfaction with training, supervision, teamwork, and job tasks.

Claims Based Analysis

Measures. Findings are presented for six measures:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day hospital readmissions per 1,000 beneficiary-episodes
- 90-day total cost of care per beneficiary-episode
- 7-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes
- 30-day PV follow-up per 1,000 beneficiary-episodes

Research Question. For each measure, what is the difference in outcome between FFS Medicare beneficiary-episodes discharged from PRHI hospitals and those from a group of comparison hospitals, after implementation of PCRC, adjusting for differences in outcomes at baseline and risk factors across both populations?

Analytic Approach. We specify and employ a set of DID models, comparing the outcomes for Medicare FFS beneficiaries targeted by PRHI's PCRC program with those for a comparison group in the pre- and post-intervention implementation periods.

Creation of Analytic Sample. For our analysis, we identify Medicare beneficiary-episodes for participants discharged with AMI, COPD, or CHF from one of the six participating PRHI hospitals, using claims-based rules for the Medicare claims data set that CMMI has made available to the HCIA evaluators. PRHI did not provide a finder file of program participants. They report that their capture rate, the percentage of patients eligible for this intervention that is managed by the PCRC team, is around 75

percent. The post-intervention group includes beneficiaries enrolled in the PCRC program from July 1, 2013, through September 30, 2014.[102]

Our study design involves both a pre-intervention period group at PRHI and an external comparison group from other hospitals. The pre-intervention group at PRHI consists of all Medicare FFS beneficiary-episodes of AMI, COPD, or CHF discharged from PRHI from July 1, 2011, through June 30, 2013. We use the same claims-based rules to identify beneficiary-episodes discharged from the awardee-affiliated hospitals in the pre-intervention and post-intervention periods.

Comparison Group. To create an external comparison group, we use Medicare claims and the CMS Provider of Service (POS) file to identify ten comparison community hospitals in geographic proximity to the awardee-affiliated hospitals and similar in pre-intervention hospital-level variables, such as participant volume for the target conditions, demographics, case mix, hospital episode costs and mortality. [103] We revised the comparison hospitals presented in this report from the comparators used previously, to achieve a more similar comparison population. Beneficiary-episodes for AMI, COPD, or CHF from these ten comparison hospitals from July 1, 2011, through June 30, 2013, constitute the pre-intervention period comparison group, and those that occurred July 1, 2013, through September 30, 2014, serve as the post-intervention period comparison group. For more details on the methods used for this analysis or the selection of comparator hospitals, refer to Appendix C.

We use propensity score models to estimate the relative probability of a beneficiary-episode being in the PRHI post-treatment group, and calculate relative weights for beneficiary-episodes in the PRHI pre-treatment, pre-comparison, and post-comparison groups. In order to account for variations in beneficiary-episode with different conditions (AMI, COPD, or CHF) and achieve better balance, we first stratify by each condition, estimate relative weights within each stratum, and pool weights across strata. Stratification allows us to account for the heterogeneity among beneficiary-episodes for different conditions. For more details on weighting see Appendix C. We incorporate these relative weights into our analysis to minimize observed differences in beneficiary-episode characteristics across PRHI post-treatment, post-comparison, pre-treatment, and pre-comparison groups.

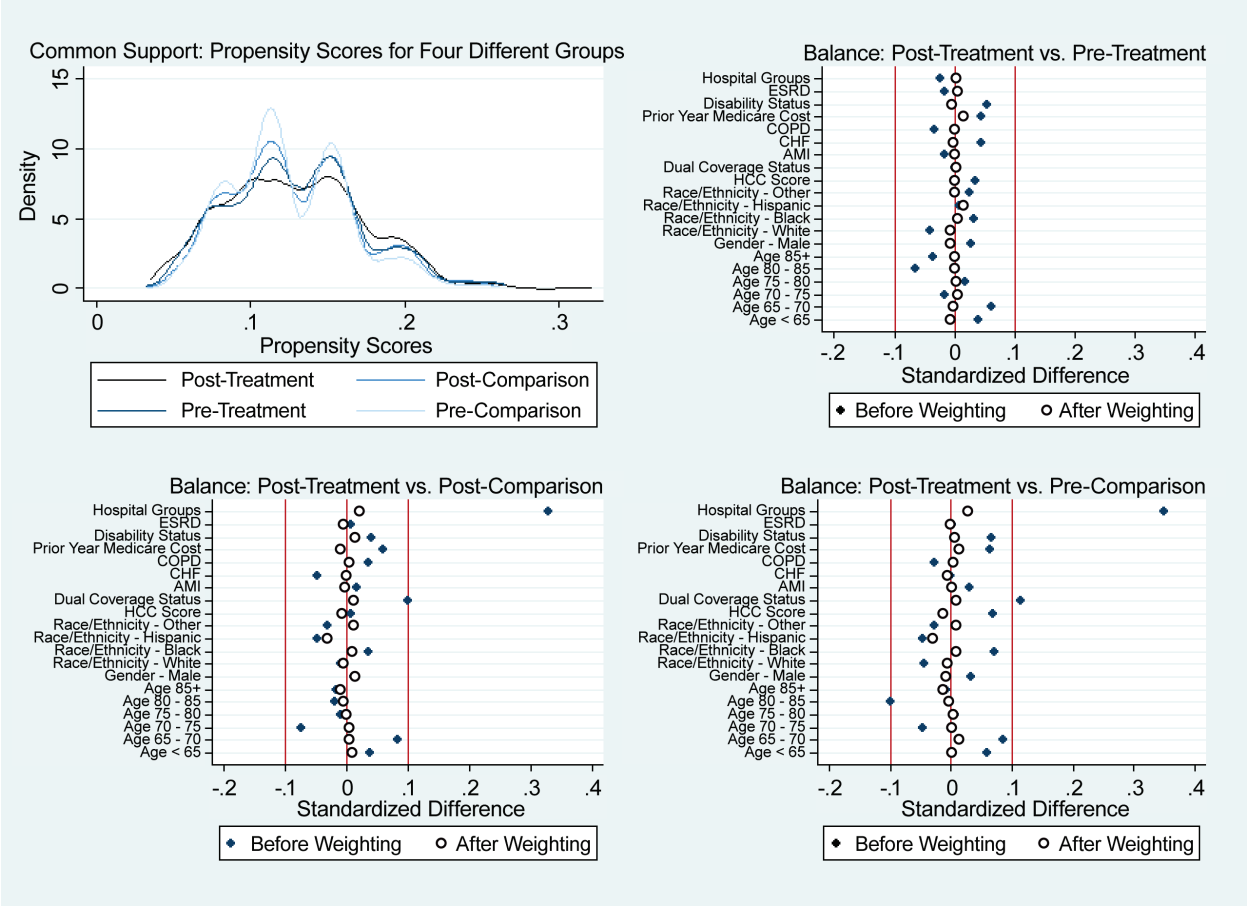
Exhibit PRHI.2 presents common support and balance in covariates across treatment and comparison groups.

- We observe a high level of overlap in the distribution of estimated propensity scores across PRHI post-treatment, post-comparison, pre-treatment, and pre-comparison group patient-episodes.
- The standardized difference between the PRHI post-treatment and each of three other (post-comparison, pre-treatment, and pre-comparison) groups for all covariates is negligible after incorporating relative weights.

[102] We used Medicare claims through December 31, 2014, for the analysis in this report. We included beneficiary-episodes discharged on or before September 30, 2014 in our analyses, to allow for a beneficiary-episode length of 90 days.

[103] The ten comparison hospitals are: Jameson Memorial Hospital, Meadville Medical Center, Monongalia County General Hospital, St. Mary's Medical Center, Saint Vincent Health Center, York Hospital, ACMH Hospital, St. Clair Memorial Hospital, Riddle Memorial Hospital, and Mount Nittany Medical Center.

Exhibit PRHI.2: Test of Common Support and Covariate Balance



Analysis

Model. We compare the change in outcomes between treatment and comparison group across the entire post-intervention period (January 1, 2013, through September 30, 2014) and the pre-intervention period (January 1, 2011, through December 31, 2012), in a DID analysis. We use generalized linear models (GLM) with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a GLM with a log link and gamma distribution. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2). Additionally, we account for the clustering of beneficiary-episodes (i) within each hospital (j).

Results

Descriptive Characteristics. Exhibit PRHI.3 displays the descriptive characteristics of beneficiary-episodes for the target and comparison groups before and after implementation of the intervention. We compare discharges occurring in the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition). In the post-intervention period July 1, 2013, through September 30, 2014, there were 3,009 hospital discharges for COPD, CHF, and AMI attributed to the intervention group and 6,678 for the comparison group, or approximately 2.2 comparison discharges for each PCRC discharge.

During the post-intervention period, beneficiary-episodes at the PCRC intervention hospitals were likely to be younger, more likely to be Black, and less likely to have CHF relative to beneficiary-episodes discharged from the comparison hospitals. Also in the same period, beneficiary-episodes from PCRC intervention hospitals had higher hospitalizations and ED visits and higher total Medicare cost in the past year. Finally, beneficiary-episodes discharged from intervention hospitals were less likely to be discharged home and more likely to be discharged to a skilled nursing facility (SNF) or home health agency (HHA), compared to beneficiary-episodes discharged from the comparison group hospitals. In this report we adjust for observed differences in baseline covariates across treatment and comparison groups using propensity score weighting, described earlier.

Exhibit PRHI.3: Descriptive Characteristics for the PCRC and Comparison Group Beneficiary-Episodes, Pre and Post Implementation

Variable	Pre-Intervention		Post-Intervention	
	PRHI	Comparison	PRHI	Comparison
Number of Beneficiary-Episodes	**5,330**	**11,874**	**3,009**	**6,678**
Age* % (N)**				
<65 years	16.5 (879)	15.7 (1870)	17.9 (539)	16.5 (1104)
65-69 years	14.9 (793)	14.0 (1666)	17.1 (515)	14.1 (942)
70-74 years	13.2 (703)	14.3 (1694)	12.7 (382)	15.3 (1019)
75-79 years	13.2 (706)	13.7 (1625)	13.9 (418)	14.2 (951)
80-84 years	15.4 (821)	16.7 (1985)	13.2 (396)	13.9 (926)
≥ 85 years	26.8 (1428)	25.6 (3034)	25.2 (759)	26.0 (1736)
Race/Ethnicity % (N)**				
White	96.4 (5140)	96.5 (11464)	95.7 (2879)	95.9 (6403)
Black	3.1 (167)	2.5 (295)	3.7 (112)	3.1 (206)
Other	0.4 (23)	1.0 (115)	0.6 (18)	1.0 (69)
Gender % (N)				
Female	52.8 (2816)	53.1 (6305)	51.4 (1547)	52.0 (3474)
Target Conditions % (N)				
AMI	24.6 (1311)	22.7 (2691)	24.0 (722)	23.3 (1555)
CHF **	37.4 (1993)	39.6 (4702)	39.6 (1192)	42.0 (2805)
COPD	38.0 (2026)	37.7 (4481)	36.4 (1095)	34.7 (2318)
Hierarchical Condition Categories (HCC)				
Mean Count of HCCs (Standard Deviation)	5.4 (3.0)	5.4 (3.0)	5.6 (3.1)	5.6 (3.0)
Mean HCC Score (SD)	3.2 (1.8)	3.2 (1.7)	3.3 (1.8)	3.3 (1.8)
Mean Utilization and Cost in Year Prior to Index Hospital Discharge				
Hospitalizations per 1,000 (SD) ***	1,698 (2,793)	1,627 (2,451)	1,811 (3,796)	1,563 (2,687)
ED Visits per 1,000 (SD) ***	1,381 (3,785)	1,241 (2,707)	1,628 (4,221)	1,295 (2,732)
Total Medicare Cost (SD) ***	$30,742 ($40,563)	$29,304 ($45,636)	$33,575 ($81,307)	$29,787 ($39,967)
Coverage Reason % (N)				
Age	67.6 (3602)	68.6 (8141)	65.4 (1968)	67.2 (4487)
Disability	30.7 (1635)	29.9 (3552)	33.1 (995)	31.4 (2095)
ESRD	0.7 (37)	0.3 (39)	0.4 (12)	0.4 (29)
Disability and ESRD	1.1 (56)	1.2 (142)	1.1 (34)	1.0 (67)
Discharge Disposition * % (N)**				
Home	41.0 (2186)	53.3 (6332)	44.5 (1338)	51.0 (3405)
SNF	18.9 (1005)	14.7 (1750)	17.3 (522)	14.7 (985)
HHA	24.1 (1284)	16.0 (1904)	21.7 (652)	17.0 (1133)
Hospice	2.3 (123)	2.2 (256)	2.3 (68)	2.4 (162)
Other	13.7 (732)	13.7 (1632)	14.3 (429)	14.9 (993)

NOTES: *p<0.10, **p<0.05, ***p<0.01.
Statistical significance is assessed using chi-square tests for proportions and t-tests for continuous variables comparing PRHI to the comparison practices during the post-intervention implementation period. Categorical variables are listed as % (N) and the count and continuous variables are listed as mean (Standard Deviation).

DID Analysis. Exhibit PRHI.4 presents the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* implementation of the

intervention. This adjusted model assesses the impact of the awardee's program across the entire post-implementation period.[104]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: The PCRC program lowered 90-day ED visits (14 fewer per 1000 episodes) and 90-day hospitalizations (2 fewer per 1000 episodes), although neither change reached statistical significance. The program did not lower 30-day hospital readmissions.
- Cost: The PCRC program lowered 90-day total cost of care by $1,508 per episode, but this result did not reach statistical significance.
- Quality of Care Measures: The PCRC program significantly increased 7-day practitioner visit follow-up (61 per 1000 episodes) and 30-day PV follow-up (34 per 1000 episodes) for its participants, relative to the comparison group.

Exhibit PRHI.4: Difference-in-Differences Estimates for the PCRC Program‡

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	-2 [-27, 22]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-14 [-49, 21]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	1 [-19, 21]
90-Day Total Cost of Care per Beneficiary-Episode ($)	-$1,508 [-$4,383, $1,367]
7-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	**61 [14, 108] ****
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	**34 [10, 58] *****

NOTES: *p<0.10, **p<0.05, ***p<0.01.

‡ Model based estimates for cost measure are obtained from generalized linear models (GLM) with log link and gamma distribution. Estimates for count measures are obtained from GLM with log link and negative binomial distribution.

Limitations and Next Steps. This analysis has several caveats, principally that it uses a claim-based rule to identify the treatment group, which includes patients (25 percent of them) who were eligible for but did not receive the intervention, which dilutes the intervention's impact. Also, this analysis includes only seven quarters of the awardee's 10-quarter implementation period. These estimates may become statistically significant with the increasing sample size with additional quarters of experience. In a later report we expect to present program impacts for the PCRC program for all core outcomes over a longer (six-month) post-discharge follow-up period. Additional analyses could also be considered that examine whether training experiences or satisfaction differ by subgroups within the sample.

Survey of Workforce and Training Experience

NORC collaborated with PRHI to tailor the questionnaire for their intervention, which included site-specific questions requested by PRHI. The sample for PRHI included 38 staff from both current PCRC sites and one PCRC site that had ended operations as of January 31, 2015, prior to data collection. Data

[104] Adjustment factors include target condition, age, race/ethnicity, gender, dual eligibility, prior year utilization, HCC score, hospital episode length, discharge disposition, disability indicator, ESRD indicator, and type of hospital.

collection began on May 14, 2015 and ended on June 5, 2015. Because of the small sample, we did not test results for statistical significance.

Results

Description of Survey Respondents. Of the 38 staff invited to participate, 24 PCRC employees completed the NORC workforce survey (63 percent response rate).[105] Most respondents (83 percent) were currently working at a PCRC and had been employed by one of the PCRC hospitals (75 percent) prior to the PCRC project. Respondents were mostly female (83 percent) and white (79 percent), with an average age of 42 years and an average of 16 years' experience working directly with patients. Across the six sites of the PRHI intervention, the single largest group of respondents are nurses (54 percent), followed by administrative staff (21 percent); almost half have earned a four year college degree (46 percent) and 12 percent report some college or trade school; see Exhibit PRHI.5.

Exhibit PRHI.5: Characteristics of PRHI Workforce Survey Respondents

Variable	Value
Number of Persons	**24**
Staff Type/Job Function % (N)	
Nursing (BSN, MSN)	54.1 (13)
Administrative	20.8 (5)
Pharmacy (Technician, RPh, PharmD)	16.7 (4)
Unknown	8.3 (2)
Highest level of Education % (N)	
Some college or trade school	12.5 (3)
Certified Nurse Assistant	0.0 (0)
College graduate	45.8 (11)
Master's, clinical	0.0 (0)
Master's, non-clinical	8.3 (2)
Doctorate (medicine, nursing, dentistry, social work, clinical psychology)	8.3 (2)
Other	20.8 (5)
Unknown	4.2 (1)

While nurse respondents take part in the full range of PRHI-related activities (90 percent or more report participating in each key task), pharmacy staff are more diverse in their experiences. All four of the pharmacy staff report reconciling medications, communicating with primary care providers, and conducting disease management and patient education, while three participate in management of symptoms, motivational interviewing, phone visits and home visits. Two of the four pharmacy staff report conducting intake screenings, follow up visits, and making referrals, while only one reported participating in advanced care planning.

[105] No responses were received from PCRC staff at Wheeling Hospital, WV.

Staff Development and Training

Formal training varies by job function, with nurses participating in all training, and pharmacy and administrative staff each taking a more tailored set of courses. Respondents reported each of the trainings to be useful.

- All trainees took the Perfecting Patient Care University course (88 percent judged as moderately to very useful) and motivational interviewing (92 percent judged as moderately to very useful).
- Nurses and pharmacy staff received clinical trainings (71 percent judged as moderately to very useful).
- Nurses and administrative staff received preceptors (all indicated that they were useful).

Motivational interviewing and PPC University are judged to be the most useful trainings.

- Nurses rank motivational interviewing as the most useful (54 percent), followed by PPC University (23 percent) and Advanced Clinical Support on Heart Failure (23 percent).
- Most administrative staff (60 percent) and half of the pharmacy staff report that the PPC University was the most useful.

Informal training also varied by job function and was considered useful by participants.

- The four pharmacy staff are less likely to report having informal training; only one experienced "informal conversations as needed" and two report participating in weekly team meetings.
- Half of the respondents indicate that "Informal conversations as needed" was moderately or very useful.
- Three-quarters of respondents indicate that weekly team meetings were moderately or very useful.
- All but one respondent participated in both PRHI-sponsored workshops and team meetings; the workshops were more likely to be ranked very useful (63 percent) than were the meetings (46 percent).

Other findings related to the training process overall:

- Most respondents (71 percent) said that trainings were worth the time invested, taught useful skills (80 percent), and prepared them for various aspects of their jobs on the PCRC project (79 percent).
- Feeling prepared: Almost all agreed that the training prepared them to use the technology that they needed (96 percent) and prepared them to work as a team (96 percent). Most also felt that the training prepared them to implement the program as intended (71 percent), and meet their patients' needs (79 percent).

Workforce Deployment: Stress

Exhibit PRHI.6 presents information on how respondents reported the balance between stress and reward levels in their work. Each cell in the table presents the percentage of respondents who reported both a

given stress level and a given reward level. Cells are shaded in darker orange colors where a higher proportion of respondents reported the same combination of stress and reward.

PCRC staff reported moderate levels of stress while also experiencing the work as rewarding. .

- Work-related stress decreased after joining the PCRC staff for the majority of respondents (58 percent), while 25 percent indicated no difference in stress level and 17 percent reported an increase in work-related stress.
- When asked to assess the balance between stress and reward in their role at the PCRCs, over one-third of respondents (38 percent) describe a moderate level of work-related stress paired with a relatively strong sense of reward. The majority of staff reported that they feel a moderate to low level of stress and a high reward in their position on the project.

Exhibit PRHI.6: Balance between Stress and Reward Levels, PRHI Trainees

		Reward Level (% Reporting)		
		High	Moderate	Low
Stress Level (% Reporting)	High	8	4	0
	Moderate	38	21	0
	Low	17	4	4

Workforce Deployment: Teamwork and Support

Improved clinical decision-making and quality of care.

- While 54 percent strongly agree that the information they communicated to patients helped patients with decision-making, only 33 percent report that the information they communicated to providers helped with clinical decision making.
- Most (96 percent) indicate that working in collaboration with a team of health care providers had a positive or very positive impact on the quality of care that patients receive.

Almost all respondents find PRHI and PCRC staff to be helpful.

- PRHI staff: All respondents identify PRHI trainers as helpful. For the 83 percent who interacted with PRHI Quality Improvement Specialists, all report that they were helpful.
- PCRC staff: Of the 67 percent who report working with the PCRC Lead, 86 percent find it to be helpful.

Most respondents have received useful support and feedback from their supervisors.

- Ninety-two (92) percent agree or strongly agree that they get the help and support they need to do their job.

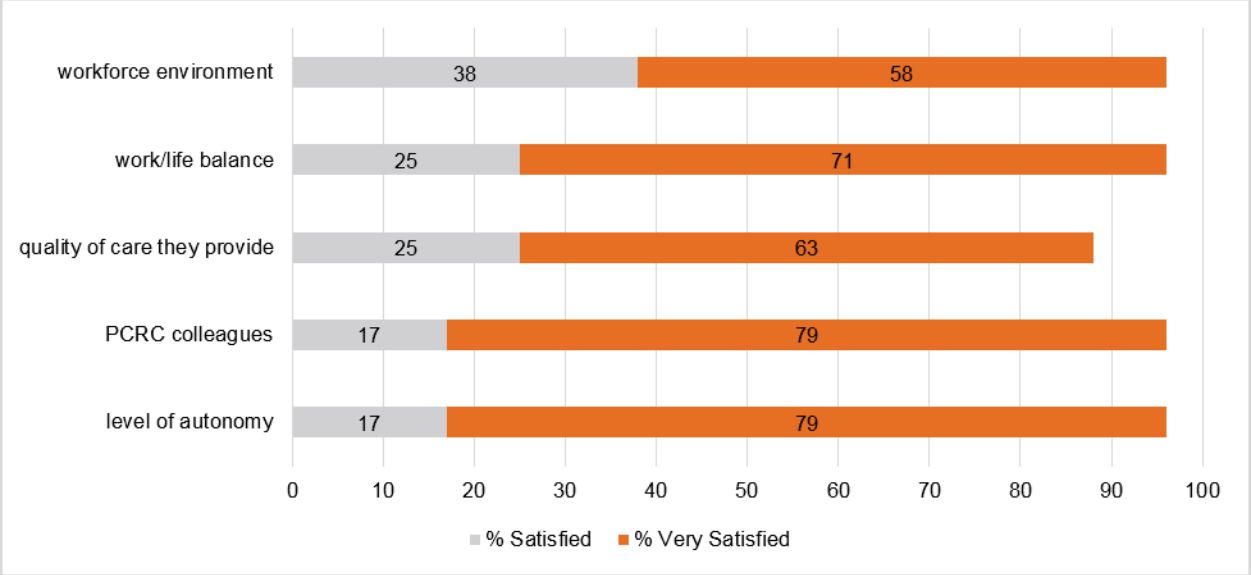
- Most (92–100 percent) indicate that their supervisor or manager provides suggestions and support on things they can improve; assists with problem solving or advice; and offers feedback on things they are doing well.
- Twenty-five (25) percent indicate that the feedback compares their performance to the performance of their colleagues, with nearly half (46 percent) noting that there were not any other staff with whom to compare performance.

Satisfaction

Respondents are satisfied with most aspects of their jobs.

- Sixty-seven (67) percent of respondents noted that they wanted to stay at their job in the next year, a general measure of satisfaction, despite the fact that staff did not know whether the HCIA funding would be available for more than another month at the time of the survey.[106] Seventeen (17) percent indicated that it was likely that they would leave within the year.
- Overall satisfaction (percentage reporting very satisfied or satisfied) across five components of PCRC work is close to 90 percent, with variation within each component among the percentage that report being very satisfied; see Exhibit PRHI.7 for a summary. The highest levels of satisfaction relate to the level of autonomy and with PCRC colleagues.

Exhibit PRHI.7: Trainee Satisfaction with Aspects of Job with PCRC



Summary

Claims-based Analysis. Our quantitative analyses of PRHI's PCRC program shows statistically significant improvements in 7-day and 30-day practitioner follow-up visits (PV) for beneficiary-episodes discharged from PRHI hospitals relative to comparison hospitals. The PCRC program also shows

[106] In June 2015, PRHI received an 8-month no-cost extension from CMMI to continue PCRC operations and transition them to sustainable funding.

statistically non-significant decreases in 90-day ED visits and 90-day cost of care. We will couple our findings with a more thorough understanding from qualitative data on key factors related to program implementation, to inform conclusions about the impact of the awardee program on health, quality of care, and utilization and cost measures.

Workforce Survey. Consistent with findings from group interviews at two PCRC sites conducted during NORC's 2014 visit to PRHI, we find in our workforce survey that PCRC respondents have a positive view of program trainings. Respondents rate the trainings as useful and say that they feel prepared to do their jobs. Motivational interviewing and PPC University are judged to be the most useful trainings. PCRC staff report moderate levels of stress while also experiencing the work as rewarding. In fact, the majority of staff are very satisfied with many aspects of their jobs, including work/life balance, quality of care they provide, PCRC colleagues, and level of autonomy.

Sustaining and Scaling the Primary Care Resource Center Program. PRHI has held follow-up meetings with hospital sites to discuss continuation of PCRC programs during the no-cost-extension (NCE) period and beyond. Within the NCE period the five remaining sites will continue to operate and PRHI expects that two of five will sustain their PCRCs post-NCE. The three other hospitals will integrate the PCRC intervention into ongoing quality improvement efforts. For the two sites where the PCRC program would continue in whole, the hospitals would financially support the program.

References

HCIA Supplemental Report #1 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 9/30/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Supplemental Report #1 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 12/31/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Supplemental Report #2 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 9/30/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Supplemental Report #2 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 12/31/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Supplemental Report for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 3/31/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Supplemental Report for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 6/30/2014. Pittsburgh Regional Health Initiative, 2014.

HCIA Narrative Progress Report for Pittsburgh Regional Health Initiative, for Reporting Quarter Ending 3/31/2015. Pittsburgh Regional Health Initiative, 2015.

HCIA Quarterly Report for Pittsburgh Regional Health Initiative, for Reporting Quarter Ending 3/31/2015. Pittsburgh Regional Health Initiative, 2015.

HCIA Supplemental Report #1 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 3/31/2015. Pittsburgh Regional Health Initiative, 2015.

HCIA Supplemental Report #2 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 3/31/2015. Pittsburgh Regional Health Initiative, 2015.

HCIA Supplemental Report #3 for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 3/31/2015. Pittsburgh Regional Health Initiative, 2015.

Providence Portland Medical Center

This chapter updates NORC's evaluation of the of the Tri-County Health Commons program, sponsored by Providence Portland Medical Center (PPMC) and Health Share of Oregon. The program aims to coordinate care for adult high-risk and high-acuity Medicaid and dually eligible Medicare and Medicaid beneficiaries in the Portland metropolitan region through both hospital- and community-based interventions. The Tri-County Health Commons project ("Health Commons") is administered by Health Share of Oregon, one of Oregon's 16 Coordinated Care Organizations (CCOs). Health Share is a collaboration of integrated health delivery systems, county-based mental health organizations, and the CareOregon Medicaid managed care organization (MCO) within the Tri-County Portland metropolitan region (Multnomah, Clackamas, and Washington Counties). The Health Commons project is one of the more multi-faceted in the HCIA Complex/High-Risk Patient Targeting portfolio, containing five separate interventions (nine, if sub-interventions are counted separately) in both hospital and community settings. The Health Commons program deploys interventions at two levels of intensity for Medicaid enrollees with greater or lesser levels of risk and acuity and includes interventions intended to: improve post-discharge transitions, reduce non-emergent use of emergency rooms, and assist patients experiencing mental health challenges and area residents experiencing homelessness. The Health Commons intervention relies heavily on the trauma-informed care (TIC) model (developed by the federal Substance Abuse and Mental Health Services Administration) to engage with its patients. The TIC model invokes six key principles for engaging with high-risk, complex patients presumed to have experienced t trauma at some point in their life: safety; trustworthiness and transparency; peer support; collaboration and mutuality; empowerment, voice and choice; and cultural, historical, and gender issues. We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analyses of program effectiveness, as well as findings from NORC's survey of workforce trainee experience.

Overview of Awardee

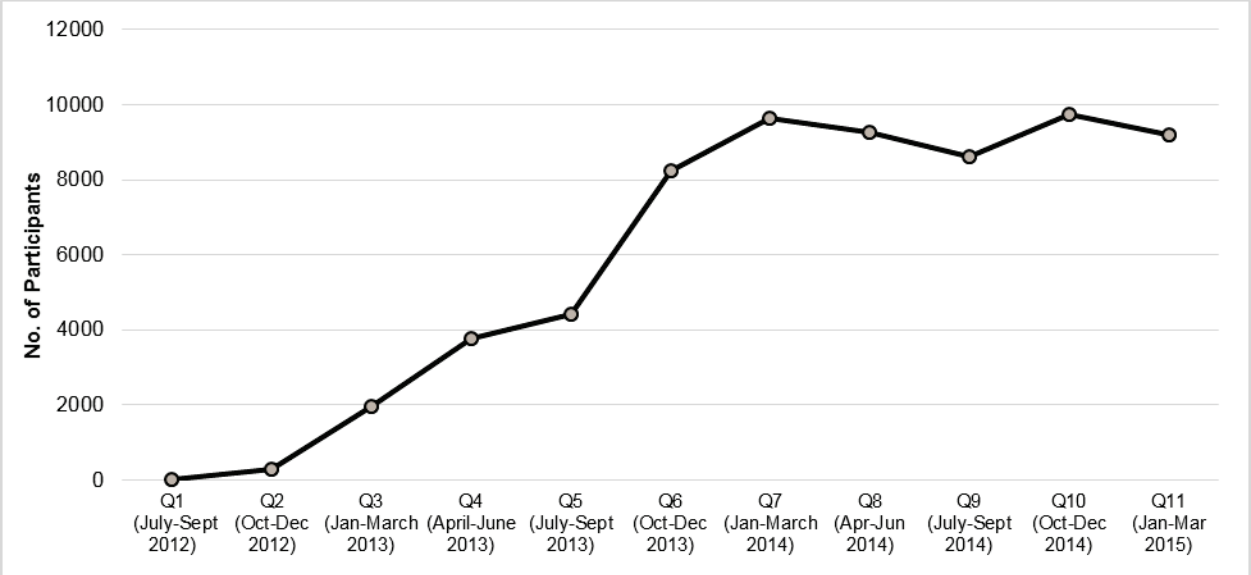
CMMI Category for Awardee:	Integrated Health System
Funding Amount:	$17,337,093
Launch Date:	9/1/2012
State(s) Where Located:	Oregon

Patients Targeted and Served

Self-reported data from Health Commons provides enrollment data by HCIA reporting quarter, as shown in Exhibit PPMC.1, for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA grant but the services are not supported by the grant). The data show a rapid increase through Q7 followed by a leveling off through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), Health Commons served 9,191 participants, both direct (3,087 participants) and indirect (6,104 participants). As of March 31, 2015, the program had served a cumulative total of 13,617 unique

participants since program launch, 87 percent of the total number projected to be served over the three years of the HCIA-funded program (15,727 participants).

Exhibit PPMC.1: Total Number of Health Commons Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Most of the enrollees are adults ages 26 through 64 years (73 percent), with eight percent being young adults ages 19 to 25 years, about seven percent minor children through age 18 years, about seven percent ages 65 through 74, and about six percent ages 75 years and older.
- Gender: Half of the participants are female (51 percent).
- Racial and Ethnic Identity: Nearly three-fourths of enrollees are identified as White (71 percent), 16 percent Black or African American, nine percent Hispanic or Latino, and three percent as Asian.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit to Health Commons (March 2014) and our first annual report (September 2014), Health Commons has continued to actively engage more patients with complex medical conditions in the Portland metropolitan area. Health Share, the CCO administering the intervention that became operational in 2012, has solidified as an organization in its own right over the past year, and has continued to deepen its relationships with constituent partners, including Providence Portland Medical Center, Oregon Health and Science University, CareOregon, Kaiser Permanente, and Legacy Health. The Health Commons team has proved adept at modifying and adapting their interventions to improve the effectiveness of services, including re-focusing the ED Guide program on a subset of patients that would benefit the most from these services. During NORC's second site visit in May 2015, we received an update on implementation from Health Commons and Health Share leadership, interviewed the internal evaluation team at the Center for Outcomes Research and Education (CORE), and the staff member

responsible for developing PopIntel, a dynamic case management software used by all project team members. NORC also interviewed members of the Care Transitions Intervention (C-TRAIN), Intensive Transition Teams (ITT) and Emergency Department Guides (ED Guides) team.

Communications and Health IT. Given the large scale of the Health Commons project and the number of interventions, project leaders meet and share insights and challenges during monthly meetings, in addition to intervention-specific team members working closely together on a daily basis. The Health Commons team benefits from a robust in-house care management tool called PopIntel, which was developed prior to the grant, but was greatly enhanced as a result of the project. PopIntel allows team members to track intervention encounters (calls, meetings, etc.), enrollment information, and claims data which are then summarized into a "Health Services Profile" snapshot view of the patient. The software automatically notifies providers when a Health Commons patient comes into the ED by matching up ED records with registry lists in the PopIntel system. Project team members also have access to an Emergency Department Information Exchange (EDIE), a statewide emergency department (ED) EHR that program staff use to track frequent utilizers. The EDIE has been especially helpful to ED Guides, who can use the EHR to quickly determine whether a patient has been frequenting other EDs, reducing possible duplication of services and also helping ED Guides work with patients to understand the reasons for their frequent ED utilization.

Patient and Caregiver Engagement. Patient engagement is a key component of the Providence Portland intervention, especially as it relates to building relationships with individuals dealing with trauma who may have mental health, addiction, and/or complex medical needs. Most program staff, to some degree, engage patients through motivational interviewing, teaching disease self-management skills or improving health literacy. Health Resilience Specialists (HRSs), the ITT, and ED Guides are especially focused on engaging patients and encouraging and supporting behavior change. For example, these team members use motivational interviewing techniques and the TIC model to build a trustful relationship with patients; work on health literacy, goal-setting, and disease-management skills; and connect patients with community resources. Earning patients' trust is a vital part of the Health Commons patient engagement process, given that these high-risk patients have often experienced distressing events or life circumstances that make it difficult for providers to connect with them.

Fidelity, Adaptability, and Self-Monitoring. As mentioned above, the Health Commons team has been adept at making modifications to improve the effectiveness of their intervention components. Central to Health Commons' process of improving the project is the internal evaluation team at CORE, who collect and analyze program data to study the effectiveness of each program and make recommendations for improvement. CORE is now responsible for maintaining an integrated analytic data set for Health Share, based on the constituent organizations' billing or encounter records. In addition, CORE recently assumed this role for all of the CCOs in Oregon. Based on an internal evaluation of the ED Guide program in 2014, CORE found that the ED Guide program appeared to be especially successful with a subgroup of the patient population comprised of newly covered Medicaid beneficiaries and high utilizers. The ED Guides therefore focused their services on these groups of patients beginning in May of 2014 and a subsequent report by CORE found that the ED Guides were more successful in reducing future patient inpatient utilization with the more focused approach.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. As mentioned earlier, the Health Commons project includes a comprehensive set of interventions aimed at care coordination for mainly adult Medicaid and dually eligible participants with multiple chronic conditions, including psychiatric, behavioral, and substance use problems. For our quantitative evaluation of this HCIA program, we grouped the Health Commons interventions in the following three categories: 1) transitional interventions aimed at post-acute care (PAC), 2) interventions in the community, and 3) interventions in the emergency department. Exhibit PPMC.2 summarizes the specific awardee interventions in the three intervention groups. It is possible for program participants to receive one or more of the interventions listed in the exhibit.

Exhibit PPMC.2: Description and Groupings of Interventions, Health Commons

Intervention	Description
Post-Acute Care (PAC) Interventions	
Standard Transitions	Program aims to build a standard, enhanced discharge summary into hospital EMRs and incorporate standard protocols for hospital transitions into primary care clinical workflows
Care Transitions Intervention (C-TRAIN)	Program provides high intensity transitions support to high-utilizing participants of all payer groups that are discharged from hospitals
Intensive Transition Teams (ITT)	Program provides transition support for participants with a psychiatric hospital admission, utilizing mobile crisis support specialists to meet participants at the hospital and follow them through their transition to outpatient care
Community Interventions	
Health Resilience Program (HRP)	Program embeds Health Resilience Specialists (HRSs) in primary care clinics to assist high utilizing participants with chronic conditions with disease management and health literacy
New Directions	Program works with participants with mental health challenges and high levels of ED utilization at OHSU, with embedded LCSWs in the ED attending participants' mental health and primary care appointments
Central City Concern Health Improvement Project (CHIPs)	Program uses outreach workers and peer wellness specialists, registered nurse and mental health professionals to provide health care services and housing to the homeless population
Emergency Department Intervention	
ED Guides	Program aims to capture individuals with high emergency department (ED) utilization but with non-acute needs to help them find a more appropriate place to receive care

In this report, we present three sets of findings, based on the following:

- Time-series analyses on program effectiveness for Health Commons' three community interventions and the emergency department intervention, for Medicaid beneficiaries enrolled from September 1, 2012, through January 29, 2015.[107] We present initial findings on hospitalizations, emergency department (ED) visits, and cost of care for Health Commons program participants and a comparison group. We find that all of the Community Interventions significantly lower the ED utilization for their program participants after enrollment. We do not

[107] The layout and the dependent variables in the Health Commons dataset currently do not allow us to present results on program effectiveness for the PAC interventions. For instance, the dataset does not allow us to report on measures of readmissions after hospital discharge. We expect to present results of program effectiveness for the PAC interventions in future reports.

find any reductions in ED visits, hospitalizations, or cost of care after program enrollment for participants in the ED intervention.

- Difference-in-differences (DID) analyses for participants enrolled in the Health Resilience Program (HRP), with a comparison group of high-risk community dwelling individuals. The HRP, which employs Health Resilience Specialists based in ambulatory care and community settings to address the needs of particularly complex and disadvantaged plan members, is a core program of the Health Commons project. For the DID analyses, we use a comparison group of Health Share plan members (Medicaid beneficiaries) enrolled during the same time period, who received no services from the Health Resilience Specialists. Because we are aware of serious limitations to the comparison group that we are able to construct with the current data set, our results showing that patients served by the HRP are more likely to be hospitalized or treated in the ED, and have a higher cost of care, relative to comparators, is tentative.
- Workforce survey findings related to job and training experiences.

In subsequent reports to CMMI, we plan to develop comparison groups for the other Health Commons programs (e.g., post-acute care interventions) and present DID analyses using appropriate comparators.

Measures. We present findings for the following three core measures, per quarter[108]:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- Total cost of care per beneficiary

Research Question. For each measure, we address the following research questions:

- What is the change in outcome for participants after enrollment in the Health Commons programs? (Time-series analyses for Community and ED Health Commons programs)
- What is the difference in outcomes between HRP participants after enrollment in the program and those of a comparison group, adjusting for differences in outcomes at baseline and risk factors across both populations? (DID analyses for HRP)

Analytic Approach. To answer the above questions, we conduct

- Time-series analyses for each Health Commons Community and ED intervention, measuring program impacts for the two groups of interventions; and
- DID analyses comparing changes in outcomes for participants in HRP with those for a comparison group, before and after enrollment in the program.

Analysis 1: Time-Series Analyses

Creation of Analytic Sample. For our analysis, PPMC has provided us a data set containing information about program participants, including enrollment dates, program participation, and health care utilization

[108] We are currently unable to measure 30-day readmissions with the data provided.

and cost measures derived from Health Share's Medicaid encounter data. The data set identifies 12,622 unique participants enrolled in at least one Health Commons program. Of these, 10,598 were observed for at least one quarter post-enrollment, and of these, 10,110 were enrolled in a Medicaid plan at the time of enrollment into a Health Commons program. For this report, our final analytic sample is composed of these 10,110 participants.[109] We present descriptive statistics for the demographic characteristics of program enrollees in the Community and ED Guides interventions in Exhibit PPMC.3. For more details on the methods used for this analysis, refer to Appendix C.

Model. To answer the research question on impact of the Health Commons interventions, we employ time-series analyses comparing the change in outcomes for program participants in the periods *before* and *after* enrollment in the program. In the two time periods, we use repeated measures on program participants, obtained per quarter, before or after enrollment in the program. We use population-averaged logistic models with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta Participant_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention period and **α** is the effect observed after enrollment in the program; *Participant* is a vector of participant demographic and clinical variables; and **β** is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, **α** is the effect of the program on outcomes over the entire post-intervention period.

Results

Descriptive Characteristics. Exhibit PPMC.3 displays the descriptive characteristics of the awardee's Medicaid beneficiaries, including demographics, chronic conditions, prior utilization, and enrollment information. Of the 10,110 participants enrolled for at least one quarter in any of the programs, 1,524 are enrolled in a community intervention (1,314 in HRP; 176 in New Directions; and 154 in CHIPs); and 4,505 are enrolled in ED Guides.[110] Program participants may enroll in multiple programs. Currently, the length of our observation period is greater for participants in the community interventions, compared to the ED intervention. The community interventions target beneficiaries with higher morbidity, compared to the ED intervention, as seen by differences in the Chronic Illness and Disability Payment System (CDPS) risk score. Over one-half of the participants are female (61 percent for community and 58 percent for ED intervention arms, respectively) and the distribution across age groups differs between the programs.

[109] In this report, we do not include descriptive statistics for the 5,243 participants enrolled in the Health Commons PAC interventions.

[110] In addition, of the 5,243 enrolled in a PAC program, 4,515 were in Standard Transitions; 699 in C-TRAIN; and 538 in ITT.

Exhibit PPMC.3: Descriptive Characteristics for Health Commons Program, Community and ED Intervention Populations

Variable	Community Interventions	ED Intervention
Number of Persons	1,524	4,505
Mean Number of Quarters Enrolled [Range]	4.6 [1-8]	3.8 [1-8]
Gender % (N)		
Female	60.6 (924)	58.3 (2,628)
Age Group % (N)		
<20 years	0.8 (13)	19.9 (896)
20-29 years	10.5 (160)	24.9 (1,120)
30-39 years	16.4 (250)	21.7 (978)
40-49 years	23.6 (360)	15.4 (694)
50-59 years	31.2 (476)	13.1 (591)
≥60 years	17.3 (264)	4.0 (182)
Race/Ethnicity % (N)		
White	65.9 (1,005)	61.0 (2,750)
Black	21.1 (322)	14.6 (659)
Hispanic	5.6 (86)	10.8 (488)
Dual Eligibility % (N)		
Dually Enrolled	20.1 (306)	5.8 (260)
Coverage Reason % (N)		
Disability	52.7 (803)	18.9 (853)
Risk Score		
Mean CDPS Risk Score* (Standard Deviation)	3.2 (2.1)	1.7 (1.8)
Chronic Conditions % (N)		
COPD	26.7 (407)	5.2 (233)
CHF	15.2 (232)	1.8 (81)
Depression	33.9 (516)	15.3 (687)
Diabetes	37.6 (573)	9.5 (427)
Asthma	37.2 (567)	19.5 (879)
Affective Disorder	47.1 (717)	22.6 (1,017)

NOTE: *CDPS Risk Score is the Chronic Illness and Disability Payment System Risk Score.

Time-Series Analysis. Results presented in Exhibit PPMC.4 summarize the differences in utilization and cost for participants, before and after enrollment in the Health Commons Program's Community and ED interventions[111]. Utilization outcomes (hospitalizations and ED visits) and cost of care are presented as the adjusted marginal effect per quarter of enrollment in the program. Data cover up to eight quarters of enrollment in the program.

The model-based estimated indicate the following:

- Across all community interventions, we observe a statistically significant decrease in ED visits for participants after program enrollment (-55.3 per 1,000 participants). We however observe significant increases in hospitalizations (25.4 per 1000 participants) and total cost of care ($678 per 1000 participants) for participants after enrollment in the community programs.

[111] All models are adjusted for age categories, race, dual eligibility, disability eligibility, high utilizer flag and CDPS risk score

- The ED intervention shows significant increases in hospitalizations, ED visits, and total cost of care for its participants after program enrollment.

Exhibit PPMC.4: Utilization and Cost Differences for Health Commons Program Participants, Before and After Enrollment

Variable	Adjusted Difference [95% Confidence Interval]
Across all Community Interventions (N=1,524)	
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**25.4 [14.6, 36.2]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**-55.3 [-69.8, -40.9]*** **
Total Cost of Care (per Beneficiary) ($)	**678 [72, 1285]** **
Health Resilience Program (N=1,314)	
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**18.7 [7.4, -30.0]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**-52.0 [-67.6, -36.5]*** **
Total Cost of Care (per Beneficiary) ($)	421 [-215, 1,057]
New Directions (N=176)	
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**64.5 [26.7, 102.3]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**-66.8 [-107.5, -26.2]*** **
Total Cost of Care (per Beneficiary) ($)	1,378 [-666, 3,421]
CHIPs (N=154)	
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**62.3 [24.8, 99.8]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**-48.2 [-93.7, -2.7]** **
Total Cost of Care (per Beneficiary) ($)	**2,812 [971, 4,653]*** **
ED Intervention: ED Guides (N=4,505)	
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**12.4 [8.7, 16.1]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**24.4 [14.5, 34.3]*** **
Total Cost of Care (per Beneficiary) ($)	**428 [270, 585]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. These results for two groups of interventions must be interpreted with caution. To assess the overall impact of these interventions, we must compare the observed changes in utilization and cost measures for program participants with changes in utilization and cost seen for a suitable comparison group of high-risk, community dwelling Medicaid beneficiaries. We propose to continue our work for assessing program effectiveness with a suitable comparison group.

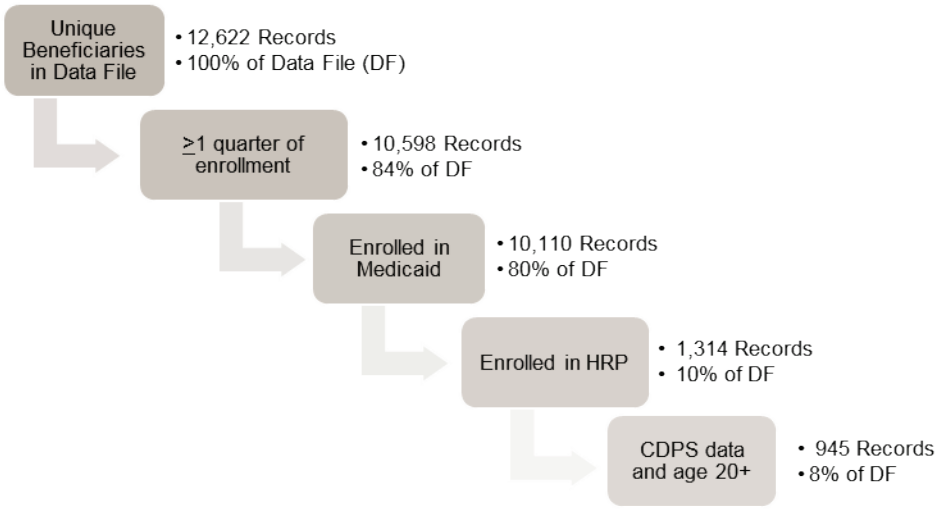
Analysis 2: Difference-in-Differences Analyses

Analytic Sample and Comparison Group. Providence Portland provided a data file, which lists program participants, and enrollment dates for participants enrolled between September 2012 and November 2014.[112] Our DID analyses in this report focus specifically on the 1,314 participants who were enrolled in the HRP program. As information on risk score is critical to this evaluation, we analyze a subset of 953 participants for whom we have valid CDPS risk score information. Finally, eight individuals under the age of 18 were enrolled in HRP, which is not sufficient to evaluate the program performance in children;

[112] Health Share claims are available from up to eight quarters prior to enrollment in Health Commons Programs (January 1, 2011 earliest available date for claims), through January 29, 2015.

we limit our analysis to adults (the youngest adult was aged 20 years), yielding an analytic sample of 945 participants; see Exhibit PPMC.5 for a summary.

Exhibit PPMC.5: Medicaid Beneficiaries in PPMC Data File Used in DID Analyses



Comparison Group and Matching. We use Health Share Medicaid beneficiaries who were enrolled during the same time period as HRP participants to create a pool of potential comparators. Since HRP participants often participated in other Health Commons programs, we likewise include comparators who participated in other Health Commons programs.

From the larger pool of comparison group members (sampling frame), we identify a smaller subset, all members of which have propensity scores similar to those of the intervention group. To find suitable comparisons for the 945 HRP participants, we used Mahalanobis metric matching—a variant of propensity score matching.[113] Propensity score matching allows us to consider intervention and comparison group members to be equally likely to be part of the intervention group (as if randomly assigned), despite differences in demographic, health and other measurable characteristics or covariates. Statistical techniques adjust for known sources of bias inherent to observational studies (i.e., differences in the covariates). Logistic regression is used to estimate a propensity score, or likelihood of being in the intervention group, based on measured characteristics for each intervention and comparison group member. In Mahalanobis metric matching, we specify a set of variables and calculate the Mahalanobis distance between the treatment and comparison group members. The comparator with the smallest distance is selected as the match. By combining Mahalanobis with propensity scores, we are able to incorporate propensity scores into the matching process. Finally, in order to select the best comparison group matches, we sampled with replacement, meaning that the comparator observation could be selected multiple times. The final propensity score models included age, race, gender, dual eligibility, disability eligibility, high utilizer flag, asthma, diabetes, affective disorder, liver disease, and depression. Mahalanobis-matched variables included HCC score, and number of hospitalizations, ED visits, and total cost of care in the year prior to the index date. Results of the propensity score model, including common

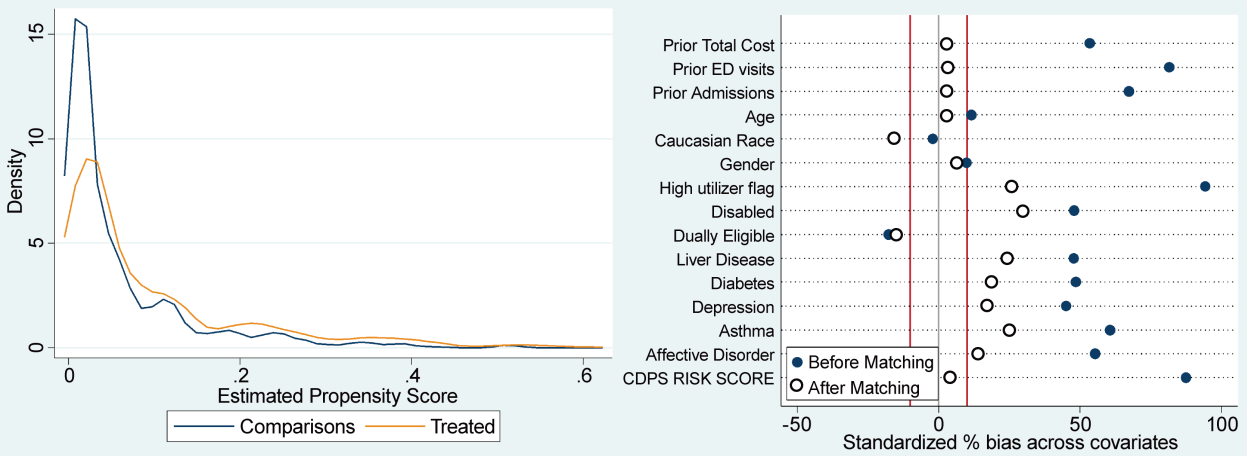
[113] Rubin DB, "Bias Reduction using Mahalanobis Metric Matching," *Biometrics* 36 (1980): 293-298.

support and covariate balance across treatment and comparisons, are provided below. For more details about comparison group selection and propensity score matching, see Appendix C.

Exhibit PPMC.6 presents common support and balance in covariates across treatment and comparison groups.

- After matching, we observe substantial overlap in the density curves for propensity score in the treatment (shown in red) and comparison (shown in blue) groups, with less overlap apparent in lower propensity score values.[114]
- In the matched sample, we were able to attain balance in measures of age, gender, CDPS risk score, number of ED visits in the year prior to index date, number of hospitalizations in the year prior to index date, and total cost of care in the year prior to index date. We were *not* able to achieve balance in race, high utilizer flag, disability eligibility, dual eligibility, and chronic disease flags of liver disease, diabetes, depression, asthma, and affective disorder, although the balance in these variables in the treatment and comparison groups did improve after matching. In subsequent analyses, we plan to expand the comparison pool to further improve the balance.

Exhibit PPMC.6: Test of Common Support and Covariate Balance



Model. We compare the change in outcomes between treatment and comparison group, across the entire post-intervention enrollment period and the pre-intervention period, in a difference-in-differences (DID) analysis. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{ Treatment}_{ij} + \beta_2 \text{Intervention} + \beta_3 \text{Treatment}_{ij} * \text{ Intervention} + \beta_4 \text{ Beneficiary}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention enrollment and post-intervention enrollment —and estimate the average treatment effect of HRP after enrollment in the program (β_3), after adjusting for baseline differences between the treatment and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2). To evaluate the effect of the HRP intervention on health care utilization, we modeled dichotomous outcomes of inpatient admission and ED visits using logistic

[114] Sensitivity analyses limiting the comparison to designated high utilizers did not substantially improve the matches.

regression. Total cost of care was modeled as a continuous variable using GLM with a gamma distribution and log link.

Results

Descriptive Characteristics. Exhibit PPMC.7 displays the descriptive characteristics for the target and comparison groups before and after implementation of the intervention. We compare 945 HRP participants to a comparison group with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (age, race, ethnicity, gender, disability, eligibility and chronic diseases). Overall, HRP participants and the comparison group are similar in gender, ethnicity, CDPS risk score and total cost of care in the year prior to enrollment. HRP participants have a slightly different composition of age cohorts, are more likely not to be White, are more likely to be disabled, less likely to be dually eligible for Medicare and Medicaid, more likely to have chronic conditions, and had higher ED utilization and higher total cost of care in the year prior to enrollment, than did members of the comparison group.

Exhibit PPMC.7: Descriptive Characteristics for the HRP Participants and Comparison Group Beneficiaries[115]

Variable	Providence Portland HRP Program	
	Treatment	Comparison
Number of Beneficiaries	945	945*
Age % (N)		
20-29 years	10.4 (98)	15.7 (123)
30-39 years	16.4 (155)	19.1 (149)
40-49 years	23.7 (224)	18.3 (143)
50-59 years	30.6 (289)	22.0 (172)
≥60 years	18.9 (179)	24.9 (195)
Race/Ethnicity % (N)		
White***	64.6 (610)	71.7 (561)
Hispanic	5.1 (48)	5.0 (39)
Gender % (N)		
Female	67.1 (634)	64.1 (501)
Dual Eligibility***	22.0 (208)	29.3 (229)
Disability***	55.5 (524)	38.8 (303)
Risk Score		
CDPS Risk Score, Mean (Standard Deviation)	3.12 (2.07)	2.98 (1.98)
Condition % (N)		
Asthma***	41.5 (392)	29.7 (232)
Depression***	34.5 (326)	26.0 (203)
Diabetes***	40.4 (382)	30.4 (238)
Affective Disorder***	47.1 (445)	39.0 (305)
Liver Disease***	22.2 (210)	14.3 (112)
High Utilizer[116] ***	46.4 (438)	32.6 (255)
Mean Utilization and Cost in Quarter Prior to Program Enrollment		
Hospitalization per 1,000 (SD)**	620 (1,098)	497 (9,175)
ED Visits per 1,000 (SD)**	3,949 (5,412)	3,345 (4,778)
Total Medicaid Cost (SD)*	$17,872 ($34,470)	$15,067 ($27,690)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. Results presented in Exhibit PPMC.8 show the difference in average outcome between the awardee's treatment group and the comparison group *after* enrollment in the HRP intervention, minus the difference in average outcome between the intervention and comparison groups *before* enrollment in the HRP intervention. This model assesses the impact of the awardee's program across the entire post-enrollment period, per quarter. Models are adjusted for factors that were not balanced through propensity score methods and include age, race, dual eligibility, disability eligibility and high utilization. We use a weighting approach in DID analyses to account for comparators being used multiple times in analyses.[117] The weighting formula is computed as the inverse of the frequency of use of a comparator in the analysis.

[115] 782 unique IDs, as 78 beneficiaries were selected as a comparison more than once.

[116] Variable provided by awardee and based on a 12-month look back into claims activity. Patients can qualify as high utilizers if any of the following conditions are met: 1) no inpatient admissions and 6+ ED visits, 2) two or more inpatient admissions OR 1 inpatient admission and 6+ ED visits or 3) one inpatient admission and 0-5 ED visits.

[117] There were 78 comparators that were used more than once: 72 were matched to two treatment IDs, five were matched to three treatment IDs, and one was matched to four treatment IDs.

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: Participants in the HRP show statistically significant increases in hospitalizations and ED visits.
- Cost: Participants in the HRP show a statistically significant increase in total cost of care.

Exhibit PPMC.8: Difference-in-Differences Estimates for the Health Resilience Program

Variable	DID Estimate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**25 [7, 42]****
ED Visits (Likelihood per 1,000 Beneficiaries)	**61 [32, 89]*****
Total Quarterly Cost of Care per Beneficiary ($)	**$1,024 [-$68, $2,116]***

NOTE: * p<0.10, ** p<0.05, *** p<0.01.

Limitations and Next Steps. We hypothesize that the counter-intuitive results produced by the DID analysis for HRP participants is a consequence of underlying, unmeasured differences between the treatment and comparison populations, possibly resulting from the program's successful engagement of the most complex patients among Health Share enrollees. The comparison group for the HRP consists of Health Share of Oregon Medicaid beneficiaries who did not enroll in any of the Health Commons programs. These beneficiaries are relatively healthier and have lower utilization than HRP enrollees, differences that persist even after propensity score matching. In addition, the analysis for the program effectiveness excludes new Medicaid beneficiaries enrolled in the HRP program, since we did not have prior measures of utilization for that population. We propose to explore using Alpha-MAX data for Oregon to develop comparison groups of beneficiaries from other Medicaid coordinated care plans (CCOs), which we would match to enrollees in the Health Commons programs. We expect to find beneficiaries in other CCOs who are more similar to the high-risk enrollees in the Health Commons programs than are the Health Share enrollees not participating in the HRP or other ED or community interventions.

Survey of Workforce Trainee Experience

NORC collaborated with PPMC to tailor the questionnaire for their intervention, which included site-specific questions requested by PPMC. The workforce survey sample for PPMC included 49 staff. Data collection began on May 14, 2015, and ended on June 5, 2015. Because of the small number of staff, we did not test for statistical significance of our findings.

Results

Description of Survey Respondents. Of the 49 staff invited to participate in the survey, 38 completed the NORC workforce survey (78 percent response rate). Respondents were mostly female (82 percent) and identified as White (68 percent), with an average age of 43 years and 11 years' experience working directly with patients. Only 40 percent of respondents had been employed by one of the Health Commons partner organizations prior to the Tri-County Health Commons project.

Respondents are employed across PPMC's multiple intervention components, with almost half working for the Health Resilience Program; see Exhibit PPMC.9.

Exhibit PPMC.9: Employment Site/Program, Survey Respondents

Variable	Value
Post-Acute Care Interventions % (N)	28.9 (11)
Standard Transitions	2.6 (1)
Care Transitions (C-TRAIN)	15.8 (6)
Intensive Transitions Team (ITT)	10.5 (4)
Community Interventions % (N)	65.8 (25)
Health Resilience Program (HRP)	44.7 (17)
New Directions	5.3 (2)
Bud Clark Commons Skin Care Clinic	7.9 (3)
Central City Concern Health Improvement Project (CHIP)	7.9 (3)
Emergency Department Interventions % (N)	21.1 (8)
ED Guides	5.3 (2)
Tri-County 911 Service Coordination Program	15.8 (6)
Other % (N)	7.9 (3)

NOTE: *In many cases, staff works in more than one setting.

Across the Health Commons interventions, the single largest group of respondents are Health Resilience Specialists, followed by social and behavioral health workers, and non-clinical licensed staff. Nearly half have attained a master's level of training (47 percent) and over one-quarter (26 percent) have earned a 4-year college degree. See Exhibit PPMC.10.

Exhibit PPMC.10: Characteristics of PPMC Workforce Survey Respondents (N=38)

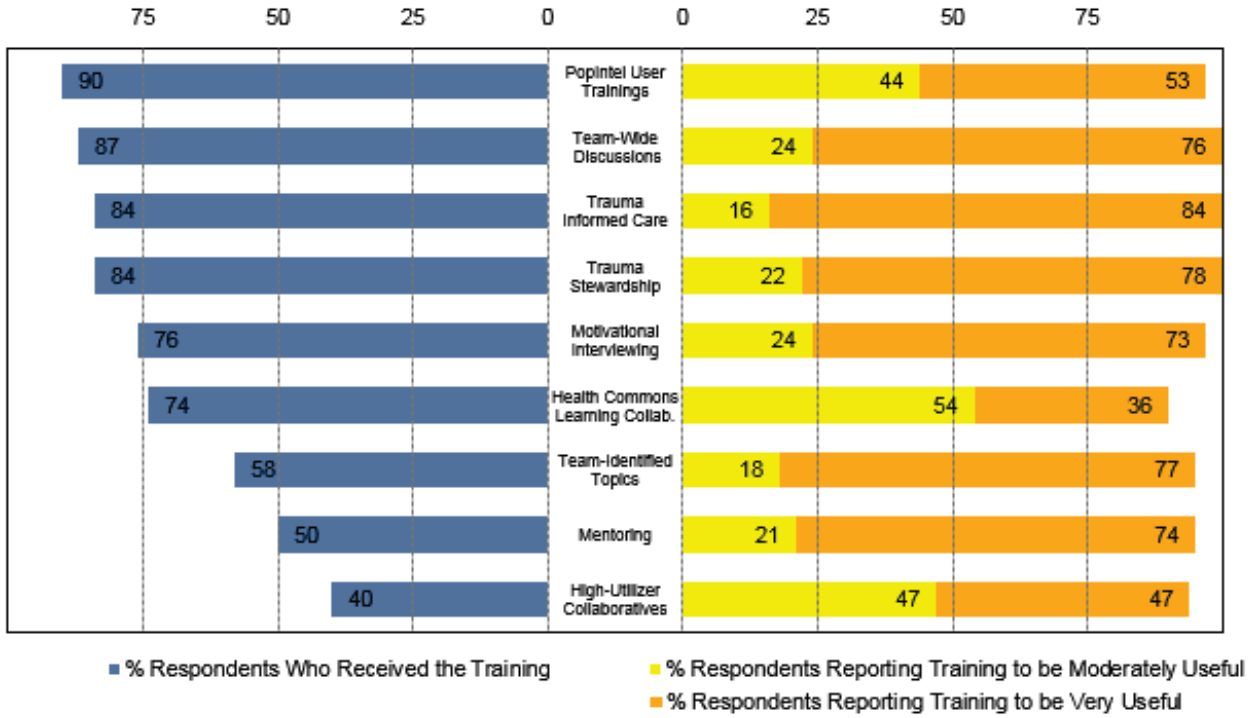
Staff Type/Job Function	% (N)
Health Resilience Specialists	31.6 (12)
Social/Behavioral Health Workers	26.4 (10)
Social Worker, Master's	21.1 (8)
Behavioral Health/Mental Health Specialist, Bachelor's or Master's Level (not Social Worker)	5.3 (2)
Non-clinical Licensed Staff	31.5 (9)
Community Health Worker (CHW)	10.5 (4)
Peer Wellness Specialist	10.5 (4)
ED Patient Guide	2.6 (1)
Registered Nurses	10.5 (4)
Other	7.9 (3)
Highest Level of Education	
High school or GED	0.0 (0)
Some college or trade school	10.5 (4)
Certified Nurse Assistant	0.0 (0)
College graduate	26.3 (10)
Master's, clinical	47.4 (18)
Master's, non-clinical	10.5 (4)
Doctorate (medicine, nursing, dentistry, social work, clinical psychology)	0.0 (0)
Other	0.0 (0)
Unknown	5.3 (2)

Development and Training

All Health Commons trainings were considered useful to the majority of participants (see Exhibit PPMC.11).

- Approximately three-quarters of respondents report receiving trainings on motivational interviewing and participating in Health Commons Learning Collaboratives; most indicated they were moderately to very useful.
- The three other types of training (team-identified topics, mentoring, and high-utilizer collaboratives) are less commonly reported but judged to be highly useful by those who participated in them.
- Health Resilience Specialists are consistently positive about trainings, whereas social/behavioral health workers and non-clinical licensed specialists have small percentages judge trainings to be not at all useful.

Exhibit PPMC.11: Health Commons Trainings, by Percent Received and Percent Reported As Useful



Staff judge trauma stewardship and motivational interviewing to be the most useful training provided by the Health Commons project.

- Overall, participants rank trauma stewardship (26 percent) and motivational interviewing (24 percent) as most useful, followed by team-wide discussions (18 percent), trauma informed care (13 percent), and Health Commons learning collaboratives (8 percent). All other trainings are rated as most useful by five percent or fewer of the sample.

- Health resilience specialists, social/behavioral health workers, and nurses rank motivational interviewing most useful (58 percent, 40 percent, and 40 percent, respectively), whereas non-clinical licensed specialists rank team-wide discussion as most useful (44 percent).

Other findings relate to the training process overall:

- Most respondents (88 percent) say that trainings were worth the time invested and taught useful skills.
- Three-quarters of respondents (75 percent) note that the trainings prepared them for various aspects of their jobs with the Health Commons project. Most respondents agree that training prepared them to use the technology that they needed (81 percent), implement the program as intended (79 percent), and meet their patients' needs (77 percent). Sixty four (64) percent agree that the trainings prepared them to work as a team.

Workforce Deployment: Stress

Exhibit PPMC.12 presents information on how respondents reported the balance between stress and reward levels in their work. Each cell in the table presents the percentage of respondents who reported both a given stress level and a given reward level. Cells are shaded in darker orange colors where a higher proportion of respondents reported the same combination of stress and reward.

Health Commons staff report moderate or high levels of stress while also experiencing the work as rewarding.

- Respondents are about equally likely to rate their work-related stress as "staying the same" (34 percent), as increased (32 percent) or decreased (32 percent).
- When asked to assess the balance between stress and reward in the role at Health Commons, for almost one-third of respondents (32 percent), a moderate level of work-related stress is paired with a relatively strong sense of reward.

Exhibit PPMC.12: Balance between Stress and Reward Levels, Health Commons Trainees

		Reward Level (% Reporting)		
		High	Moderate	Low
Stress Level (% Reporting)	High	10.5	13.2	7.9
	Moderate	31.6	21.1	0.0
	Low	5.3	2.6	0.0

Workforce Deployment: Teamwork and Support

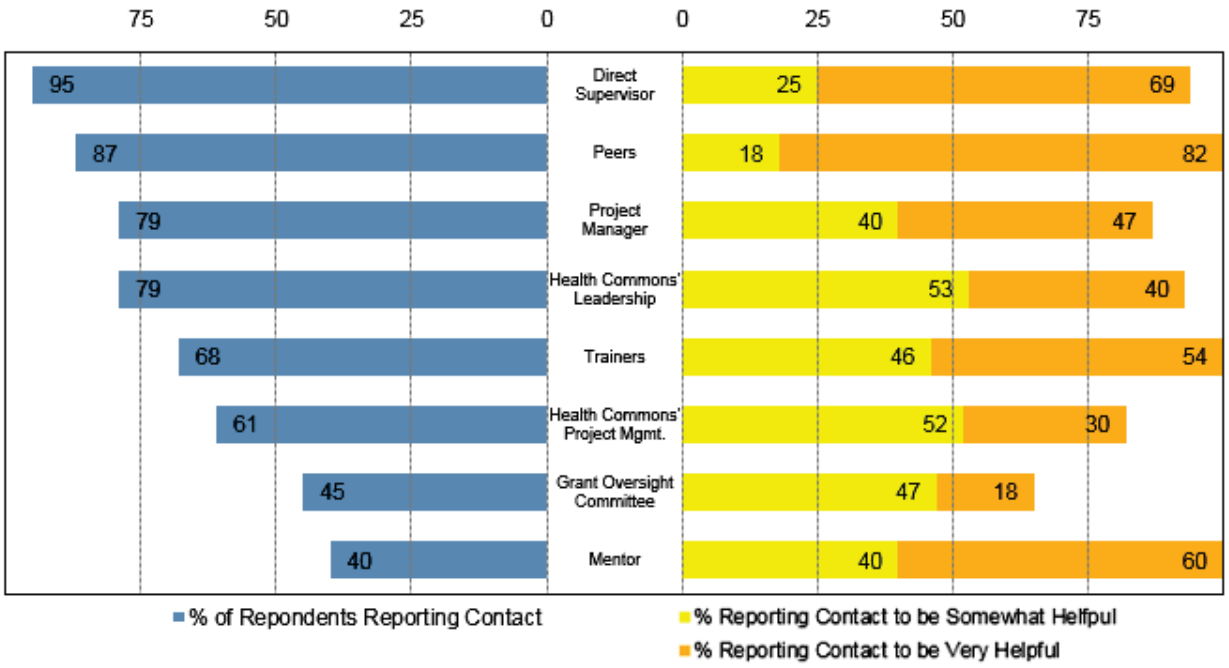
Health Commons trainees contribute to clinical decision making and quality of care.

- Most respondents report that the information they provide to their team has had an impact on clinical decision making (80 percent) and that their participation in team-based care had a positive impact on patient quality of care (100 percent).

Trainees see Health Commons staff as helpful.

- Contacts with peers, trainers, and mentors are the most likely to be considered somewhat to very helpful but varied in terms of how often they occurred, with peer contact being the most common and mentor contact the least common. See Exhibit PPMC.13.

Exhibit PPMC.13: Contact with Helpful Health Commons Staff



Most respondents have received useful support and feedback from their supervisors; only about one-third get feedback that compares their performance with that of their peers.

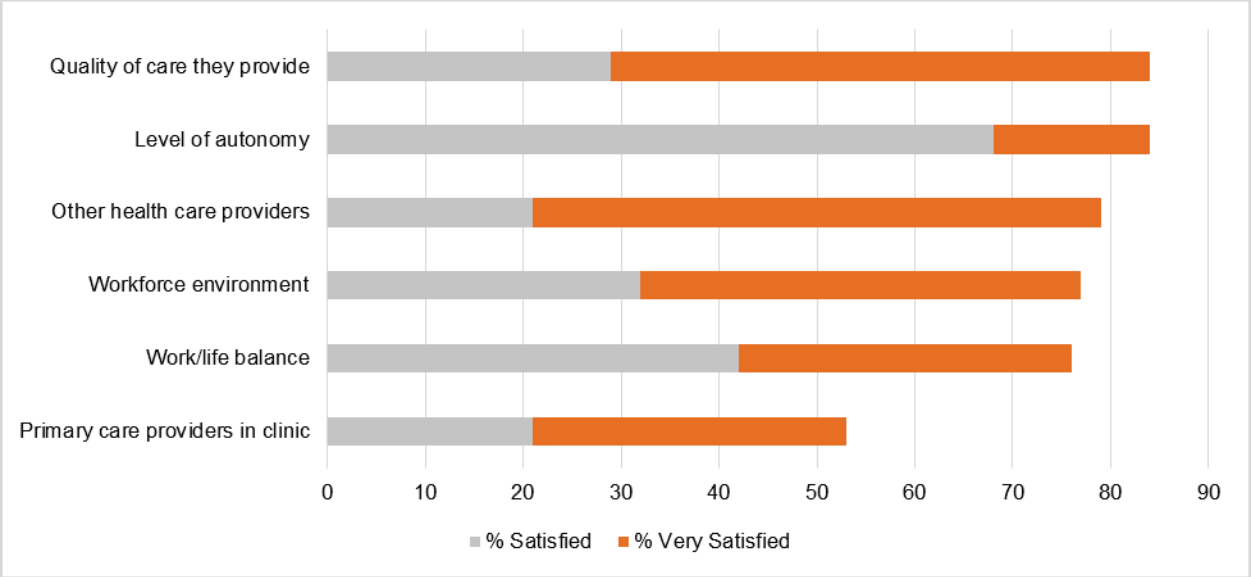
- Seventy-nine (79) percent agree or strongly agree that they get the help and support they need to do their job.
- Most respondents indicate that their supervisors/managers provided suggestions and support on things they could improve (82 percent); assisted with problem solving or advice (90 percent); and offered feedback on things they were doing well (87 percent).
- Only 32 percent of respondents indicate that the feedback compares their performance to the performance of their colleagues; 37 percent indicate the feedback did not compare their performance, and 24 percent note that there weren't any other staff that shared their position.

Satisfaction

In general, respondents expressed satisfaction with their job (82 percent).

- Sixty (60) percent of respondents reported that they wanted to stay at their job in the next year, a general measure of satisfaction despite the fact that staff did not know whether the HCIA funding would be available for more than another month at the time of the survey.[118] Sixteen (16) percent indicated that it was likely that they would leave within the year.
- Overall satisfaction (percentage reporting that very satisfied or satisfied) across six components of Health Commons work varies markedly; see Exhibit PPMC.14 for a summary. The highest levels of satisfaction relate to the level of autonomy and the quality of care provided to patients.

Exhibit PPMC.14: Percent of Health Commons Trainees Feeling Satisfied with Various Aspects of Their Work



Summary

Claims-based Analysis. Our time-series analyses of the Health Commons programs show that all three Community Interventions—the Health Resilience Program, CHIPS, and New Directions—significantly lowered ED utilization for their program participants after enrollment. We saw an increase in ED visits following enrollment in the ED Guides intervention. However, in the absence of a comparison group, we are unable to assess the overall impact of the ED Guides intervention. Our DID analyses estimated the impact of the HRP, compared with a group of Health Share Medicaid beneficiaries that were not in the HRP program. This analysis showed increases in hospitalizations, ED utilization, and total cost of care, although we believe these results to be biased by systematic differences between HRP enrollees and the comparison group.

[118] Providence Portland's HCIA funding ended June 30, 2015.

Our program effectiveness analyses for the Health Commons programs have several limitations, in addition to the lack of comparison groups for two of the community interventions and the ED intervention. We are unable to report program effectiveness for the PAC programs, due to limitations in the dataset. In future reports, we plan to expand our analyses of program effectiveness of Health Commons to include the PAC interventions and address the participation of Health Commons patients in multiple programs.

Workforce Survey. We do find in our review of PPMC survey data that the majority of respondents have a positive view of Health Commons program trainings and considered PopIntel, trauma informed care, trauma stewardship, and team-wide discussions to be the most useful. Respondents note that trainings were worth the time invested, taught useful skills, and prepared them for various aspects of their jobs on the Health Commons project. While Health Commons staff report moderate to high levels of stress, they also report experiencing the work as rewarding. Staff report that teamwork had a positive effect on the quality of care and clinical decision making. Respondents also say that they received good feedback and were supported by their supervisors. Overall, Health Commons respondents indicate they were satisfied with their jobs, especially with the quality of care they provide to patients and the level of autonomy they are afforded. We will consider additional analyses to examine whether training experiences or satisfaction differ by subgroups within the sample.

Sustaining and Scaling the Health Commons Program. Health Commons is sustaining all of the intervention components following the end of HCIA funding. The aims of the HCIA intervention and those of the CCO Health Share, and their organizational partners, as part of the new Medicaid health care delivery system model in Oregon, have remained aligned as the CCO matured. While the Health Commons model may not be fully replicable outside of Oregon, given the unique local health care market and Medicaid reform in the state, there are strong opportunities to replicate the intervention in other CCOs within Oregon. A leader at PPMC, part of five-state hospital system organization Providence Health & Services, mentioned that their organization plans to take the Health Commons findings to other CCO leaders in Oregon. Additionally, CareOregon, a Medicaid managed care entity that operates in Health Share as well as other CCOs, may likewise spread intervention components to other locations Discussions are also underway with FamilyCare, the other CCO in the tri-county area, around developing innovative programs for common services, such as a non-emergency medical transport system.

References

HCIA Supplemental Report #1 for Providence Portland Medical Center, for Reporting Quarter End Date 9/30/2013. Providence Portland Medical Center, 2013.

HCIA Supplemental Report #2 for Providence Portland Medical Center, for Reporting Quarter End Date 9/30/2013. Providence Portland Medical Center, 2013.

HCIA Supplemental Report #3 for Providence Portland Medical Center, for Reporting Quarter End Date 9/30/2013. Providence Portland Medical Center, 2013.

HCIA Supplemental Report for Providence Portland Medical Center, for Reporting Quarter End Date 6/30/2013. Providence Portland Medical Center, 2013.

HCIA Supplemental Report #1 for Providence Portland Medical Center, for Reporting Quarter End Date 3/31/2014. Providence Portland Medical Center, 2014.

HCIA Supplemental Report #1 for Providence Portland Medical Center, for Reporting Quarter End Date 12/31/2014. Providence Portland Medical Center, 2014.

HCIA Supplemental Report #2 for Providence Portland Medical Center, for Reporting Quarter End Date 3/31/2014. Providence Portland Medical Center, 2014.

HCIA Supplemental Report #2 for Providence Portland Medical Center, for Reporting Quarter End Date 12/31/2014. Providence Portland Medical Center, 2014.

HCIA Supplemental Report for Providence Portland Medical Center, for Reporting Quarter End Date 6/30/2014. Providence Portland Medical Center, 2014.

HCIA Narrative Progress Report for Providence Portland Medical Center, for Reporting Quarter End Date 3/31/2015. Providence Portland Medical Center, 2015.

HCIA Quarterly Report for Providence Portland Medical Center, for Reporting Quarter End Date 3/31/2015. Providence Portland Medical Center, 2015.

South Carolina Research Foundation

This chapter updates NORC's evaluation of the South Carolina Research Foundation's HOME CARE+ intervention. HOME CARE+ augments the current services of regional home care agencies in South Carolina by training home care agency licensed nurses, including registered nurses and licensed practical nurses, to provide person-centered care coordination. These nurses, referred to as Home Care Consultants (HCCs), work with clients, their family caregivers, and personal care aides to coordinate the day-to-day care of clients. South Carolina provides an additional change through an agency facilitated training program for personal care aides (PCAs). Trained PCAs are referred to as Home Care Specialists (HCSs). The goal is to enhance an existing home care Medicaid reimbursement structure with trained in-home workers and personalized relationships with clinicians, therefore allowing participants to age safely and well-educated in the comfort of their homes.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

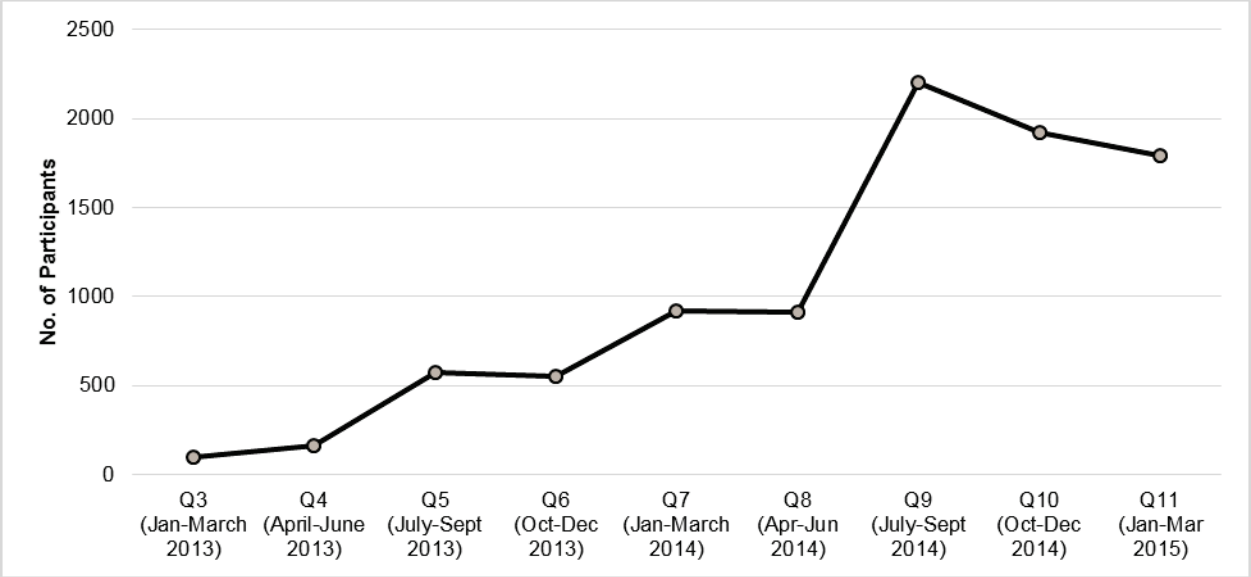
Overview of Awardee

CMMI Category for Awardee:	Other-University Affiliated Nonprofit
Funding Amount:	$2,884,719
Launch Date:	1/10/2013
State(s) Where Located:	South Carolina

Patients Targeted and Served

Self-reported data from SCRF provides enrollment data by HCIA reporting quarter, as shown in Exhibit SCRF.1, for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA grant but the services are not supported by the grant). The data show an increase through Q9 and then a slight decline through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), HOMECARE+ served 1,790 participants (483 direct and 1,307 indirect participants). As of March 31, 2015, the program had served a cumulative total of 671 unique participants since program launch, exceeding the total number projected to be served over the three years of the HCIA-funded program (630 participants).

Exhibit SCRF.1: Total Number of SCRF Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Close to half of patients are 75 years or older (43 percent, or 206 patients), with adults ages 65 to 74 comprising 25 percent, and adults ages 26 to 64 comprising 32 percent.
- Gender: Three out of every four patients are female (75 percent).
- Racial and Ethnic Identity: About two-thirds of patients are Black or African American (64 percent), with Whites accounting for 35 percent of patients.

Update: Implementation Experience in the Third Year of Award

Since NORC's site visit to Home Care + (March 2014) and our first annual report (September 2014), the program has continued to implement their intervention across three regions and 24 counties within South Carolina. This has included ongoing work with partner Personal Care Provider Agencies to implement HCS training and provide knowledgeable HCC staff. In addition, the awardee has continued to develop training materials, creating modules for HCS staff.

Communications and Health IT. Home Care + completed production of 13 modules for the Home Care Specialist Training on Chronic Health Conditions presented online. The modules can be downloaded to an online Learning System through the University of South Carolina, Office for the Study of Aging website. SCRF created two training DVDs for Home Care Consultants to aid in training consistency through pre-set and replicable examples. One DVD focuses on person-centered initial assessments and the second, on collaborative problem solving.

In response to data completeness concerns, SCRF implemented a tablet for data collection during enrollment, initial assessment and follow-up assessments. This information is stored on the Home Care + Database, which has become a warehouse for the qualitative and quantitative data across the various sites.

SCRF has seen improvements in completeness of self-monitoring and chart data, allowing the HCC to conduct patient chart reviews for incremental check-ins across all participants in the program.

Patient and Caregiver Engagement. HOME CARE + is a person-centered care delivery and training model aimed to aid participants abilities' to stay in their home for a longer duration of time. This person-centered approach begins in the Home Care Consultant (HCC) training, as detailed in the HCIA Complex/High-Risk Patient Targeting: Fifth Quarterly Report (2015). "The first HCC training module explains person-centered care, focusing on the appropriate language to use when speaking with clients, as well as how to get to know the client. This is emphasized by suggesting HCCs ask consumers about 'their life story', family, and preferred activities. During the March 2014 site visit, HCCs remarked that the person-centered care resulted in closer relationships with the client in comparison to clinical care settings (pp 255)."

The person-centered approach helps the HCC engage participants during home visits. In the Quarter 10 narrative, the awardee reports that they are engaging participants through "actively involving the HCS (the participant's most trusted source) in visits to help them feel comfortable and understand the team approach, providing one-on-one demonstrations and personalized education and allowing participants to self-discover how their actions impact their ability to remain at home (pp 8)." The awardee relies on these informal measures of patient engagement, and does not have a formal self-monitoring measure of patient engagement.

Fidelity, Adaptability, and Self-Monitoring. SCRF encountered various administrative burdens due to the partner structure of their award, with the most salient being the lack of control over the presentation of HCS training. According to the awardee's 12th Quarterly Narrative Progress Report to CMMI (for the time period ending June 30, 2015), a total of 869 PCAs completed 1 module of the Chronic Disease Management training, but only 116 have completed the 12 modules required to be a Home Care Specialist. While the original award allowed PCPA's to decide how to present training modules, it lead to various scheduling inconsistencies in an already high-turnover workforce. To combat this issue, SCRF created the online modules to allow PCA's to access the training from anywhere and keep to a more consistent and personalized schedule.

In response to feedback provided by NORC from the site visit in 2014, SCRF implemented a HOME CARE+ conference to facilitate communication and interaction between all staff and partners. This was particularly important for staff based out of participants' homes, who do not have frequent opportunities for coworker supports. To follow up on this conference, SCRF hosted a HOME CARE+ Closeout Conference to highlight accomplishments throughout the grant implementation and lessons learned. To address the time between conferences, SCRF created and distributed a newsletter for HCCs, PCPA administrators and trainers to serve as a communication tools for sharing best practices or addressing recently identified concerns among staff.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures

specific to an individual awardee. We present results of time series analyses for Medicare fee-for-service (FFS) beneficiaries enrolled in the HOMECARE+ program from January 10, 2013, through September 30, 2014. Medicare FFS beneficiaries comprise 23 percent of the awardee's targeted patients. In this report, no comparison group is used because we do not have a data set (such as Medicaid claims) available from which to identify clients comparable to those served by the HOMECARE+ program. This report includes results for core utilization and cost measures. We find no statistically significant changes in utilization or cost for Medicare beneficiaries from the period before the HOMECARE+ program began to the period following its implementation, although most measures of utilization increased between these time periods, as did the cost of care. ED visits decreased in the post-intervention period compared to the pre-intervention period. These findings are not unexpected in an elderly population with functional limitations.

Measures. Findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total quarterly cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

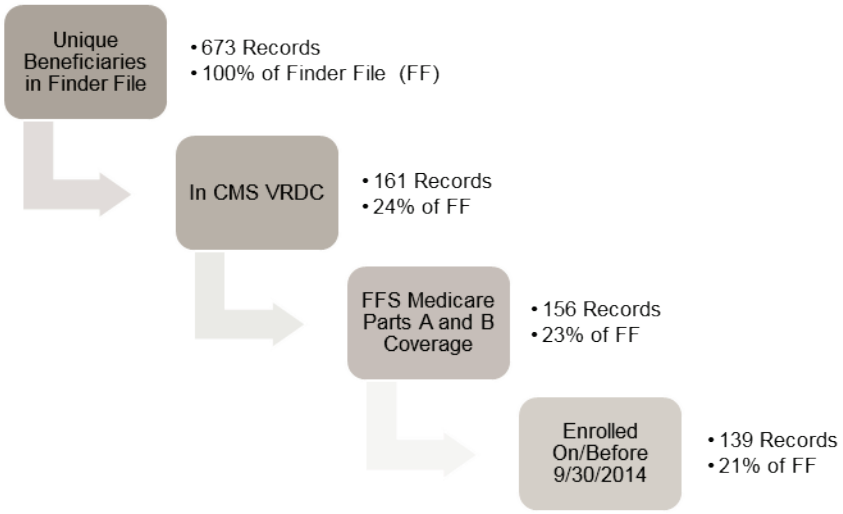
Research Question. For each measure, what is the change in outcome for participants after enrollment in HOMECARE+?

Analytic Approach. We specify and employ a time series model, comparing the experiences of participants in SCRF's HOMECARE+ program between the pre- and post-intervention implementation periods.

Finder File and Creation of Analytic Sample. SCRF provided a finder file of its program participants and their enrollment dates, enabling us to pull Medicare claims for these beneficiaries to calculate outcome measures. As shown in Exhibit SCRF.2, the finder file identifies 673 unique participants in HOMECARE+. We have matched 161 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC); 156 of these are in FFS Medicare during the month of program enrollment. One hundred thirty-nine (139) of these HOMECARE+ participants enrolled in the program by September 30, 2014, comprising our analytic sample.[119]

[119] Medicare claims are available through December 31, 2014, for the analysis in this report. We used September 30, 2014, as the cut-off date to account for the 90-day claims runoff.

Exhibit SCRF.2: FFS Medicare Beneficiaries Identified Through SCRF Finder File



Analysis

Model. We employ population-averaged logistic models with binary outcome variables for utilization (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we use a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta \text{Participant}_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the t^{th} *Time* vector. *Time* is specified as an indicator variable denoting the post-intervention period; **α** is a vector of effects corresponding to the relevant time variables in the models; *Participant* is a vector of participant demographic and clinical variables; and **β** is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, the primary outcome of interest is the difference between **α** for the post-intervention period and **α** for the pre-intervention period. The results of these models are presented in Exhibit SCRF.4.

Results

Descriptive Characteristics. Exhibit SCRF.3 displays the descriptive characteristics of HOMECARE+ Medicare FFS beneficiaries with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment. Of the 139 participants in our analytic file enrolled for at least one quarter in HOMECARE+, the average number of quarters of enrollment is 4.1, with the longest enrollment being eight quarters. Because too few program participants have been enrolled for six or more continuous quarters (n=28) to observe meaningful trends, we include only the first five quarters of enrollment in the analysis. The majority of these Medicare participants are female (75 percent) and Black (63 percent). About 86 percent of them are also Medicaid beneficiaries (dually enrolled) and 49 percent gained Medicare coverage before age 65 years for reasons of disability or end-stage renal disease (ESRD).

Exhibit SCRF.3: Descriptive Characteristics for the HOME CARE+ Medicare Enrollees

Variable	Value
Number of Persons	139
Mean Number of Quarters Enrolled [Range]	4.1 [2 - 8]
Gender % (N)	
Female	74.8 (104)
Age Group % (N)	
<65 years	25.2 (35)
65-69 years	14.4 (20)
70-74 years	10.1 (14)
75-79 years	8.6 (12)
80-84 years	13.7 (19)
≥85 years	28.1 (39)
Race/Ethnicity % (N)	
White	36.7 (51)
Black	63.3 (88)
Dual Eligibility % (N)	
Dually Enrolled	86.3 (120)
Coverage Reason % (N)	
Age	51.1 (71)
Disability	48.2 (67)
ESRD and Disability	0.7 (1)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	2.1 (1.5)
Mean Count of HCCs (SD)	3.1 (2.8)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$22,159 ($35,444)
Hospitalizations per 1,000 (SD)	719.4 (1484.4)
ACS Hospitalizations per 1,000 (SD)	165.5 (839.2)
30-Day Readmissions per 1,000 (SD)	151.1 (806.8)
ED Visits per 1,000 (SD)	1330.9 (2224.3)

Time Series Analysis. We discuss the differences in cost and utilization for the HOMECARE+ participants pre- and post-implementation of the program (see Exhibit SCRF.4).[2] The results for utilization outcomes show the adjusted marginal difference from the population-averaged logistic models for the number of participants with the outcome, while total cost of care is the adjusted marginal difference from the gamma distribution GEE model.

The model-based estimates indicate the following, relative to the pre-intervention period:

- Utilization Measures: We observe increases in hospitalizations and 30-day readmissions (26.2 per 1,000 beneficiaries and 14.3 per 1,000 beneficiaries, respectively) and a decrease in ED visits of 8.7 per 1,000 beneficiaries in the post-intervention period; none of these changes reaches statistical significance. For this small sample, these changes in utilization reflect 3.6 additional

[2] Adjustment factors include post-intervention indicator, age category, race/ethnicity, extent of FFS coverage, extent of dual eligibility, HCC score, and disability indicator.

hospitalizations, two additional 30-day readmissions, and about one fewer ED visit in the population during the post-intervention period.

- Cost: We observe a non-significant increase of $1,107 in total quarterly cost of care per beneficiary in the post-intervention period.
- Quality of Care Measures: We observe a non-significant increase in ACS hospitalizations of about six per 1,000 beneficiaries in the post-intervention period, reflecting an increase of almost one ACS hospitalization in this small population during the post-intervention period.

Exhibit SCRF.4: Utilization and Cost Differences for HOME CARE+ Participants Before and After Implementation

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	26.2 [-8.4, 60.9]
ED Visits (Likelihood per 1,000 Beneficiaries)	-8.7 [-47.6, 30.3]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	14.3 [-4.0, 32.6]
Total Cost of Care per Beneficiary ($)	$ 1,107 [$-452, $2,665]
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	6.2 [-12.3, 24.6]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis is limited by the small analytic sample (139 participants), which represents just 23 percent of all program participants are included in the analysis, likely biasing the results. Furthermore, lacking Medicaid data, we do not have a comparison group for the awardee and thus cannot compare these results to a similar population that does not receive the HOMECARE+ intervention. In future reports, we plan to include a comparison group in our analysis.

Summary

Claims-based Analysis. Our quantitative analysis of the HOMECARE+ program shows non-significant increases in hospitalizations, ACS hospitalizations, 30-day readmissions, and total cost of care, and a decrease in ED visits among its Medicare FFS participants in the post-intervention period compared to the pre-intervention period. These findings of increased utilization and cost of care over time are not surprising for this aging population with functional limitations.

Sustaining and Scaling the Home Care+ Program. The awardee is able to leverage the institutional support provided by the University of South Carolina Arnold School of Public Health to provide the Home Care Specialist training modules online, including the certification of completion. This will allow PCAs to participate in training without placing any burden or extra responsibilities on PCPA staff.

SCRF is continuing to look into sustainability avenues, such as an inclusion in the scope of a state Medicaid services waiver (both Home Care Consultant RN for care planning and Home Care Specialist for personal care aides). As a part of this effort, program staff have created a scope of services to clearly outline the activities of these new roles. The staff have met with South Carolina Department of Health and Human Services to explore possible involvement of the Home Care + program.

Data Collection and Analysis: Survey Development

NORC conducted stand-alone surveys for both the Home Care + consumers and workforce, following several rounds of review and refinement of survey items, in consultation and collaboration with SCRF. NORC mailed surveys to SCRF Home Care Consultants and affiliated regional home care agencies or Personal Care Provider Agencies (PCPAs), in May 2015 for administration to Home Care + clients and personal care aides (Home Care Specialists), respectively. Data collection continued through August 1, 2015. The consumer survey was a brief paper-based questionnaire administered by the HCC during their monthly visit with each Home Care+ client, or conducted by phone if an in-person visit was not possible. Home Care + clients evaluated their HCSs (also known to clients as a personal care aide) on factors such as provider accessibility, working relationship, and patient satisfaction; a subset of health and demographic questions was also included. HCCs mailed completed consumer surveys to NORC. A total of 162 consumer surveys have been received.

Administration of the paper-based workforce survey was facilitated by PCPAs, who distributed the surveys to HCSs. The workforce survey contained questions about Specialists' working relationship with Home Care Consultants, daily work, thoughts regarding the impact of the Home Care Specialist training program, and a limited number of demographic questions. PCPAs returned the completed surveys to NORC by mail, along with contact information for those Specialists who had participated in the survey. NORC subsequently mailed $10 gift cards or $10 cash to participating HCS respondents. A total of 187 workforce surveys have been received. Responses recorded on the paper instruments for both surveys is being entered electronically and checked for accuracy of data entry. After analyzing the two SCRF surveys, we expect to report findings in our next quarterly report (Q8).

In August 2015, SCRF shared data from their own baseline consumer survey, which asks questions about the Home Care + client's health, satisfaction with current home care services, care coordination, self-perceptions (e.g., feeling listened to), behaviors related to medication use, and service utilization. NORC plans to review and analyze these survey results also, and discuss findings in future reports to CMMI.

References

"Baseline Interview HOME CARE+." South Carolina Research Foundation, 2013.

"Collaborative Approach to Problem Solving Competency Assessment." 1-4: South Carolina Research Foundation, 2013.

"Home Care + 6-Month Interview with Pcpa Owner/Administrator." South Carolina Research Foundation, 2013.

"Home Care Consultant Return Demonstration of Home Care + Home Visits Competency Assessment." South Carolina Research Foundation, 2013.

"Home Care Consultant Training Outline." South Carolina Research Foundation, 2013.

"Home Care Specialist Certification." In *Modules*, 1-2: South Carolina Research Foundation, 2013.

"Home Care Specialist Training Feedback." 1: South Carolina Research Foundation, 2013.

"Home Care Specialist Trainer Feedback." 1-2: South Carolina Research Foundation, 2014.

"Home Care Specialist Training Modules." South Carolina Research Foundation, 2014.

"Interview with Pcpa Trainer." South Carolina Research Foundation, 2014.

HCIA 11QR Quarterly Report for South Carolina Research Foundation, for Reporting Quarter End Date 3/31/2015. Submitted by SCRF, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by SCRF, 2015.

St. Francis Healthcare Foundation of Hawaii

This chapter updates NORC's evaluation of the Home Outreach Program and E-Health (H.O.P.E), sponsored by St. Francis Healthcare Foundation of Hawaii. The awardee provides home telehealth monitoring for high-risk Medicare beneficiaries living independently in both urban and rural areas. H.O.P.E. has two complementary interventions: one for patients whose condition may be unstable at time of hospital discharge, for whom the program provides telemonitoring for 30 days post hospitalization, and the other for high-risk patients living at home, who receive telemonitoring over the course of one year. For the 30-day intervention, H.O.P.E. recruits patients at high risk for rehospitalization prior to hospital discharge. Initially limited to patients diagnosed with congestive heart failure (CHF), pneumonia, or acute myocardial infarction (AMI), the intervention was later expanded to include patients with chronic obstructive pulmonary disease (COPD) and ESRD. In addition to having at least one of these diagnoses, patients eligible for recruitment must meet one of the following criteria: one or more hospitalizations within the past year and require assistance with activities of daily living (ADLs). The one-year intervention enrolls patients referred from the community (typically by their primary care practitioner (PCP)) for telemonitoring over the course of a year. This longer intervention emphasizes changing patient behavior to improve the self-management of chronic conditions, with the related goal of reducing hospitalizations. For both interventions, nurse clinicians (referred to as telehealth nurses) make home visits to install and instruct patients in the use of standard, commercially available home monitoring equipment that can operate either via telephone or wireless connections. The telehealth nurses set up the peripheral monitoring devices and provide patient and caregiver training at home. Patients are asked to take daily health measurements, including blood pressure, pulse rate, oxygen saturation, weight, and blood sugar (if indicated) using the monitoring equipment as part of their care plan.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

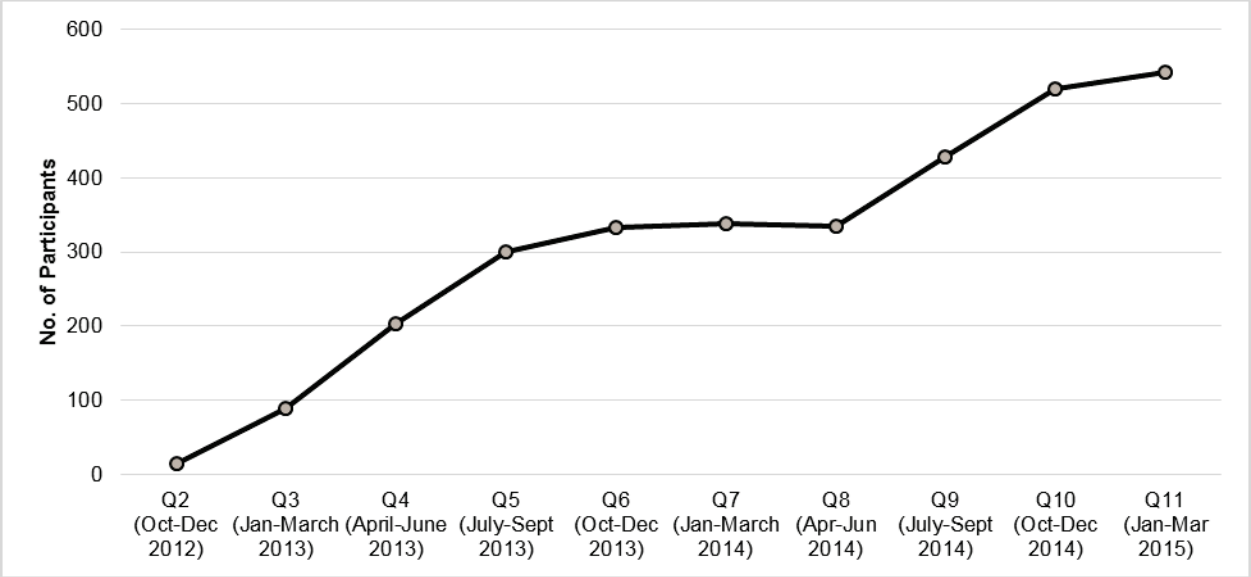
Overview of Awardee

CMMI Category for Awardee:	Foundation
Funding Amount:	$5,299,706
Launch Date:	11/27/12
State(s) Where Located:	Hawaii

Patients Targeted and Served

Self-reported data from St. Francis provides enrollment data by HCIA reporting quarter for both arms of the intervention, as shown in Exhibit HOPE.1. The data show a steady increase over time, with a more rapid increase since Q8. During the most recent quarter for which data are available (January 1 through March 31, 2015), H.O.P.E. served 542 participants. As of March 31, 2015, the program had served a cumulative total of 1,426 unique participants since program launch, 73 percent of the total number projected to be served over the three years of the HCIA-funded program (1,942 participants).

Exhibit HOPE.1: Total Number of H.O.P.E. Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: About two-fifths are age 75 years and older (42 percent), with the remaining population split between adults ages 65 to 74 (23 percent) and adults ages 26 to 64 (35 percent).
- Gender: Just over half of the patients are male (52 percent).
- Racial and Ethnic Identity: Two-fifths of patients are Asian (39 percent); Native Hawaiians/Pacific Islanders accounted for 22 percent of the participants, and Whites for an additional 18 percent. 19 percent of patients were of two or more races/ethnicities.

Update: Implementation Experience in Third Year of Award

Since NORC's visit to H.O.P.E. (March 2014) and our first annual report (September 2014), St Francis has continued to expand enrollment in both arms of the program and introduce the H.O.P.E. interventions to providers and professional associations as valuable components of a transitional and primary care. Initially operating in Hilo and Honolulu, during the third year of the award St. Francis closed enrollment at its location in Hilo and established the 30-day intervention at the new Queen's Medical Center in West Oahu. Thus these changes have amounted to a consolidation of program activities with a single H.O.P.E. team on Oahu. Both physician word of mouth and patients reporting satisfaction with the program have led to increased referrals to the program. The H.O.P.E. team also anticipates acquiring referrals from the Queen's Medical Center Emergency Department for enrollment in the 1-year program. Some enrollment challenges have persist in the program's third year, as patients referred from primary care providers may meet health eligibility criteria but are unable to enter the program because they either reside in a home with no electricity, or lack support to assist with daily health measurements, or do not have access to a phone line.

Communications and Health IT. The telemedicine nurses who engage with and maintain regular contact with the patients are skilled communicators trained in motivational interviewing. Nurses are assigned a

primary caseload but are able to cover for colleagues to ensure seamless coverage at all times. The equipment vendor provides technical support and initial training for the nurse clinicians with the equipment and software, and equipment read outs are well-structured and prioritized by acuity of outlier values, if present.

In August 2014 H.O.P.E. faced major challenges due to two hurricanes in Hawaii. Fallen trees, downed power lines, damaged homes, and closed roadways caused several patients at the Hilo location to lose power for approximately two weeks, rendering them unable to report daily telehealth measurements. H.O.P.E telehealth nurses instead called those affected patients via cell phone on a daily basis to monitor their condition.

Patient and Caregiver Engagement. The emphasis of the H.O.P.E. program's one-year intervention is to empower and engage patients through monitoring their own health conditions, with nurse clinician oversight to reinforce and support their efforts. By equipping the home environment with simple devices that measure blood pressure, pulse rate, oxygen saturation, weight, and blood sugar (if indicated), patients are encouraged to take a more active role in managing their chronic diseases. Telehealth monitoring equipment, in conjunction with clinical oversight and interaction with a telehealth nurse, facilitates patients' participation in their treatment. Patients transmit their measurements electronically to the data base monitored by the telehealth nurse on a daily basis or several times a week. The frequency of telephone contacts varies by patient, but telehealth nurses contact each patient at least once per week. Calls may be more frequent, especially if the transmitted data shows an anomaly or alert.

A number of contextual factors moderate the success of patient engagement. Cultural differences have been a challenge for the H.O.P.E. program, both because of language barriers and because many patients and their families are not immediately comfortable allowing a stranger into their homes to install monitoring equipment.

Fidelity, Adaptability, and Self-Monitoring. After an initially slow rate of referrals and enrollment, the implementation team took active steps to improve it. Enrollment criteria were loosened beyond the original requirements that stipulated patients had to have been hospitalized at least once in the past year, and present with a Karnofsky score of 60 or below; additionally, referring physicians were asked to recommend patients for consideration. Furthermore, H.O.P.E. modified their referral form, making it easier for referring physicians to complete. All of these steps improved enrollment in each of the implementation arms. Fidelity of implementation of the intervention has likely been enhanced by the consolidation of the H.O.P.E. staff on Oahu.

H.O.P.E. employs the Remote Technology Model of Care Survey (RTMCS) as a measure of patient satisfaction with their experience with the program and with their nurses. Participants enrolled in the year-long program are surveyed upon its completion. Participants enrolled in the 30-day post-hospital intervention are surveyed after 30 days or upon completion of the program. Self-monitoring data from St. Francis for the October-December 2014 reporting period show that patient satisfaction with staff responsiveness, and encouragement and support they receive from intervention nurses remains high for both programs. On average, patients reported a score of 4.5 for the questions related to responsiveness ("The RT nurse called me back right away…"), encouragement ("The RT nurse encouraged me to contact

my doctor…") and support ("The support and assistance from the RT nurse helped me manage my health conditions at home").

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. Results are presented for both the one-year community telemonitoring program and the 30-day post-acute telemonitoring program. For the 30-day post-acute program, we identify similar beneficiary-episodes discharged from the H.O.P.E program hospitals during the pre-intervention period. We present results of time series analyses for Medicare fee-for-service (FFS) beneficiaries in St. Francis' two H.O.P.E. interventions from October 1, 2012, through September 30, 2014. These FFS beneficiaries comprise 36 percent of the awardee's targeted patients.[120] Because of the small numbers of Medicare FFS enrollees in each of these interventions, we have not yet created an external comparison group for either of them. We plan to include an external comparison group for both the 1-year community intervention and the 30-day post-acute intervention in subsequent NORC reports. We find that the 1-year community intervention significantly reduces ambulatory care sensitive (ACS) hospitalizations and reduces hospitalizations and total cost of care for its participants after enrollment, although the changes in hospitalizations and cost do not reach statistical significance. We find that the 30-day post-hospital intervention significantly reduces total cost of care at 90 days following discharge and significantly increases post-discharge primary care follow-up for beneficiary-episodes.

Measures. For the 1-year community program, findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total quarterly Medicare cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

For the 30-day post-acute program, findings are presented for six measures:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes
- 90-day total cost of care per beneficiary-episode
- 7-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes
- 30-day PV follow-up per 1,000 beneficiary-episodes

Research Question. For each measure, we address the following research questions:

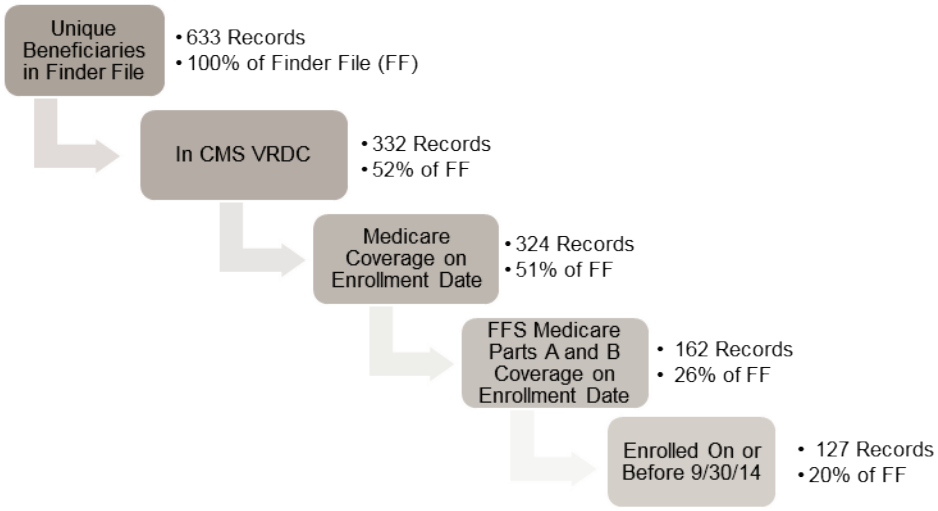
[120] Based on St. Francis' self-reported data to CMMI, as presented in HCIA Q11 Awardee Performance Report

- For the 1-year community program, what is the change in outcome for participants after enrollment in the intervention?
- For the 30-day post-acute program, what is the change in outcomes for beneficiary-episodes discharged from H.O.P.E hospitals after implementation of the intervention?

Analytic Approach. For both the 1-year and the 30-day interventions, we specify and employ time series models. For the 1-year community program we compare changes in outcomes for participants in the program before and after enrollment. For the 30-day post-acute program, the time series model compares changes in outcomes for beneficiary-episodes discharged from the H.O.P.E hospitals before and after implementation of the H.O.P.E program.

Finder File and Creation of Analytic Sample. St. Francis provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[121] As shown in Exhibit HOPE.2, the finder file listed 633 unique participants in the 1-year H.O.P.E. program. We matched 332 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC) and 162 of these were in FFS Medicare during the month of program enrollment. Of these participants, our final analytic sample includes 127 beneficiaries enrolled on or before September 30, 2014.

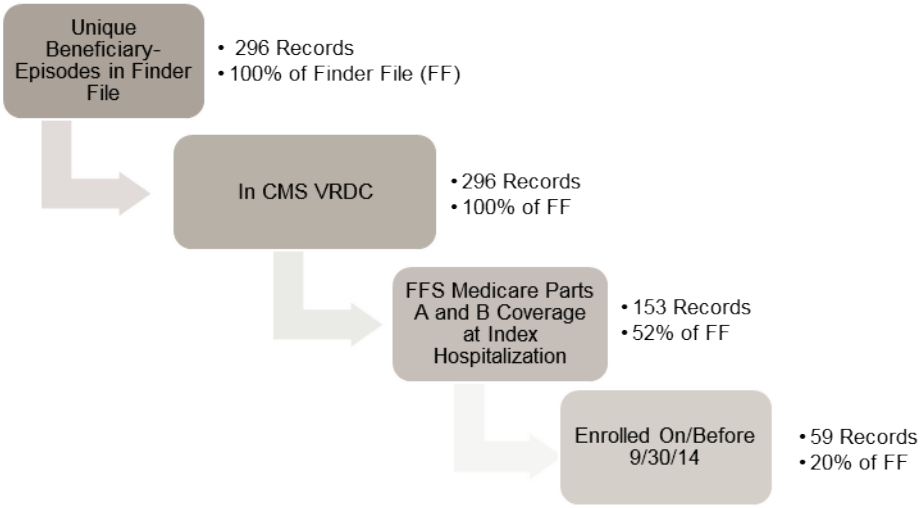
Exhibit HOPE.2: FFS Medicare Participants Identified through H.O.P.E. Finder File for the 1-year Community Program



As shown in Exhibit HOPE.3, the finder file also identified 296 unique participants in the 30-day post-acute H.O.P.E. program. We matched all 296 of these individuals to Medicare beneficiary identifiers in the VRDC; 153 of these were FFS Medicare during the month of program enrollment. Our final analytic sample for the post-acute analysis consists of 59 of these participants who were enrolled on or before September 30, 2014.

[121] We used Medicare claims through December 31, 2014, for the analysis in this report. We included beneficiary-episodes discharged on or before September 30, 2014, in our analyses, to allow for a beneficiary-episode length of 90 days.

Exhibit HOPE.3: FFS Medicare Beneficiary-Episodes Identified Through H.O.P.E. Finder File for the 30-Day Post-Acute Program



Analysis 1: 1-Year Community Program

Model. We employ time-series analyses, measuring the change in outcomes for program participants in the periods *before* and *after* enrollment in the program. In the two time periods, we use repeated measures on program participants, obtained per quarter, before or after enrollment in the program. We use population-averaged logistic models with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta Participant_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention period and **α** is the effect observed after enrollment in the program; *Participant* is a vector of participant demographic and clinical variables; and **β** is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, **α** is the effect of the program on outcomes over the entire post-intervention period.

Results

Descriptive Characteristics. Exhibit HOPE.4 displays the descriptive characteristics of H.O.P.E. Medicare FFS beneficiaries enrolled in the 1-year program with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment characteristics. Of the 127 patients in our analytic file enrolled for at least one quarter, the average number of quarters of enrollment was 3.8, with the longest enrollment being eight quarters. Half of the participants are female, 30 percent are White, and one-third are Asian; 37 percent are identified as other races. About one-fifth of patients are dually enrolled and 76 percent gained Medicare coverage at age 65 years.

Exhibit HOPE.4: Descriptive Characteristics for H.O.P.E. Program Enrollees, 1-year Community Program

Variable	Value
Number of Persons	127
Mean Number of Quarters Enrolled [Range]	3.8 [1 - 8]
Gender % (N)	
Female	51.2 (65)
Age Group % (N)	
<70 years	27.6 (35)
70-74 years	11.8 (15)
75-79 years	20.5 (26)
80-84 years	21.3 (27)
≥85 years	18.9 (24)
Race/Ethnicity % (N)	
White	29.9 (38)
Asian	33.1 (42)
Other	37.0 (47)
Dual Eligibility % (N)	
Dually Enrolled	21.3 (27)
Coverage Reason % (N)	
Age	76.4 (97)
Disability	16.5 (21)
ESRD	3.9 (5)
Disability and ESRD	3.1 (4)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	3.2 (1.7)
Mean Count of HCCs (SD)	5.3 (2.9)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$39,828 ($38,632)
Hospitalizations per 1,000 (SD)	1637.8 (1401.1)
ACS Hospitalizations per 1,000 (SD)	574.8 (904.3)
30-Day Readmissions per 1,000 (SD)	330.7 (690.7)
ED Visits per 1,000 (SD)	1637.8 (2537.6)

Time Series Analysis. Results presented in Exhibit HOPE.5 represent the differences in utilization and cost for participants, before and after enrollment in the H.O.P.E. 1-year program.[2] Utilization outcomes (hospitalizations, ACS hospitalizations, 30-day readmissions, and ED visits) and cost of care are presented as the adjusted marginal effect per quarter of enrollment in the program.

The model-based estimates indicate the following:

- Utilization measures: Hospitalizations decrease non-significantly for the 127 program enrollees, after their enrollment in the H.O.P.E. 1-year program (- 35.4 per 1,000 beneficiaries). We do not observe any decrease in ED visits or 30-day readmissions.
- Cost Measures: We observe a statistically non-significant decrease of total cost of care ($794 per beneficiary) after program enrollment.

[2] Adjustment factors include post-intervention indicator, age category, race/ethnicity, extent of FFS coverage, extent of dual eligibility, HCC score, and disability indicator.

- Quality of Care Measures: ACS hospitalizations decrease significantly by 34 per 1,000 beneficiaries, after enrollment in the H.O.P.E. 1-year program.

Exhibit HOPE.5: Utilization and Cost Differences for H.O.P.E. 1-year Community Program Participants, before and after Enrollment

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalization (Likelihood per 1,000 Beneficiaries)	-35.4 [-80.0, 9.2]
ED Visits (Likelihood per 1,000 Beneficiaries)	19.0 [-9.3, 47.3]
30-day Readmission (Likelihood per 1,000 Beneficiaries)	1.4 [-42.6, 45.5]
Total Quarterly Cost of Care (per Beneficiary) ($)	-$794 [-$2,532, $945]
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	**-34.0 [-62.1, -5.9]****

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis is limited by a relatively small number (127) and proportion (20 percent) of program participants in the analytic sample. The analytic sample of FFS Medicare beneficiaries is likely to introduce some bias. Another limitation is that we do not have a comparison group for 1-year program and thus cannot compare these results to a similar population that does not receive the H.O.P.E 1-year intervention. In future reports, we expect to present results with a comparison group of high-risk community-dwelling Medicare beneficiaries in Hawaii.

Analysis 2: 30-Day Post-Acute Program

Comparison Group. We use Medicare claims to identify Medicare FFS beneficiary-episodes occurring during the pre-intervention period similar to those of participants in the H.O.P.E 30-day post-acute program. While H.O.P.E's finder file allows us to identify beneficiary-episodes in the post-intervention period, we use claims-based rules to identify Medicare beneficiary episodes discharged from H.O.P.E hospitals in the pre-intervention period.[122]

Model. We employ time-series analyses comparing the change in outcomes for beneficiary-episodes discharged from H.O.P.E hospitals in the periods *before* and *after* implementation of the 30-day H.O.P.E program. In the two time periods, we use 90-day post-discharge beneficiary-episodes before and after implementation of the program as the unit of analysis. We use logistic models with binary outcome variables for utilization outcomes (e.g., did hospitalizations occur 90-days of hospital discharge for an episode?). For total cost of care, we use a generalized linear model (GLM) with a log link and a gamma distribution. The models are specified as:

$$Y_i = \beta_0 + \beta_1 \text{Post-Period}_t + \beta_3 \text{Beneficiary-Episode}_i + \varepsilon_{it}$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary-episode in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention implementation period and $\boldsymbol{\beta_1}$ is the effect observed after

[122] We identify Medicare beneficiary-episodes discharged from H.O.P.E hospitals during the pre-intervention period that met the inclusion criteria for the 30-day post-acute program. We only include beneficiaries that had a short-term inpatient stay at the treatment hospitals who were discharged alive. Beneficiaries admitted to the hospitals and transferred to another inpatient facility are excluded from our analysis.

program implementation; *Beneficiary-Episode* is a vector of beneficiary-episode demographic and clinical variables. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, β_1 is the effect of the program on beneficiary-episode outcomes over the entire post-intervention period.

We also incorporated propensity scores into our models with standardized mortality ratio (SMR) weighting in order to minimize differences between beneficiary-episodes in the pre- and post-intervention periods. For a more detailed explanation of SMR weighting, please refer to Appendix C.

Results

Descriptive Characteristics. Exhibit HOPE.6 displays the descriptive characteristics of H.O.P.E. beneficiary-episodes before and after implementation of the intervention. We compare discharges occurring in the pre-intervention and post-intervention periods with respect to demographics, comorbidities, and prior utilization and test differences between the two periods using a t-test for continuous measures (comorbidities and utilization before index hospitalization) and a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, and dual coverage). Beneficiaries discharged from the hospital during the post-intervention period have significantly more comorbidities and experience significantly more ED visits in the year prior to the intervention compared to beneficiary-episodes discharged before the intervention. We observe no significant differences in age, gender, race, eligibility for dual coverage, original coverage reason, mean HCC score, or prior year hospitalizations or cost.

Exhibit HOPE.6: Descriptive Characteristics for the 30-Day H.O.P.E. Program Beneficiary-Episodes and the Pre-Implementation Beneficiary-Episodes

Variable	Pre-Intervention	Post-Intervention
Number of Beneficiary-Episodes	1099	59
Gender % (N)		
Female	44.5 (489)	47.5 (28)
Age Group % (N)		
<70 years	14.4 (158)	25.4 (15)
70-74 years	17.5 (192)	18.6 (11)
75-79 years	17.7 (194)	15.3 (9)
80-84 years	14.6 (160)	10.2 (6)
≥85 years	15.4 (169)	16.9 (10)
Race/Ethnicity % (N)		
White	40.5 (445)	47.5 (28)
Asian	28.6 (314)	30.5 (18)
Other	30.9 (340)	22.0 (13)
Dual Eligibility % (N)		
Dually Enrolled	39.2 (431)	42.4 (25)
Coverage Reason % (N)		
Age	71.0 (780)	54.2 (32)
Disability	24.5 (269)	42.4 (25)
ESRD	1.8 (20)	1.7 (1)
Disability and ESRD	2.7 (30)	1.7 (1)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)	2.6 (1.6)	3.1 (1.7)
Mean Count of HCCs (SD)***	4.2 (2.7)	5.3 (3.0)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Total Medicare Cost (SD)	$25,850 ($37,169)	$33,856 ($55,811)
Hospitalizations per 1,000 (SD)	1034.6 (1471.2)	1203.4 (1627.1)
ED Visits per 1,000 (SD)***	2452.2 (4344.7)	1796.6 (2827.1)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Time Series Analysis. Results presented in Exhibit HOPE.7 represent the differences in utilization and cost for participants, before and after enrollment in the H.O.P.E. 30-day program.[123] Utilization outcomes are presented as the adjusted marginal effect in the post-intervention period per 1,000 beneficiary-episodes and cost as the adjusted marginal effect in the post-intervention period per beneficiary-episode for 90-day cost of care.

The model-based estimates indicate the following:

- Utilization Measures: We observe decreases in 90-day hospitalizations, in ED visits, and in 30-day readmissions in the post-intervention period; however, none of these changes reaches statistical significance.
- Cost: We observe a statistically significant decrease in total 90-day cost of care of $16,868 per Medicare beneficiary-episode over the post-intervention period.

[123] Adjustment factors include age, gender, race/ethnicity, extent of FFS coverage, season, dual eligibility, HCC score, and disability indicator.

- Quality of Care Measures: We observe a statistically significant increase in both 7-day and 30-day practitioner follow-up visits (PV) after implementation of the H.O.P.E. 30-day program (188 and 114 per 1,000 episodes, respectively).

Exhibit HOPE.7: Utilization and Cost Differences for the H.O.P.E. 30-Day Program Participants Before and After Implementation

Variable	Adjusted Difference [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	-38.2 [-166.1, 89.8]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	39.5 [-90.0, 168.9]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	6.5 [-109.0, 122.1]
90-Day Total Cost of Care per Beneficiary-Episode ($)	**-$16,868 [-$23,691, -$10,046]*** **
7-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	**187.9 [61.5, 314.4]****
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	**114.0 [0.5, 227.6]****

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis is limited by its very small analytic sample (59 beneficiary-episodes). Further, the FFS Medicare population represents fewer than half of the intervention population. Another limitation is that we do not have an external comparison group for the 30-day post-acute program and thus cannot entirely attribute the observed effects to the H.O.P.E. intervention. In future reports we plan to present results with a comparison group of Medicare beneficiary-episodes discharged from similar hospitals in Hawaii.

Summary

Claims-based Analysis. Our quantitative analysis of the H.O.P.E. 1-year community program shows significant decreases in ACS hospitalizations for program participants after enrollment. We also observe decreases in hospitalizations and total cost of care that are not statistically significant. For the H.O.P.E. 30-day post-acute program, our analysis indicates significant decreases in total cost of care and a significant increase in practitioner follow-up visits for beneficiary-episodes after implementation of the program. We also observe a non-significant decrease in 90-day hospitalizations for beneficiary-episodes after program implementation.

Sustaining and Scaling the H.O.P.E. Program. The H.O.P.E. program has secured probable support from St Francis Home Health to maintain its telemonitoring service. It anticipates a possible future partnership with Hawaii's largest health plan, Hawaii Medical Service Association. Other health plans and hospitals have also expressed interest in these interventions, specifically, Hawaii Pacific Health, in entering into a partnership to implement the HOPE program at its affiliated hospital sites. The positive results shown with St. Francis' own claims-based analysis of utilization and cost, and the promising results from this evaluation, should lead to sponsorship of this service by payers and providers bearing some risk.

References

HCIA Supplemental Report #1 for St. Francis Healthcare Foundation of Hawaii, for Reporting Quarter End Date 9/30/2014. Submitted by St. Francis, 2014.

HCIA Supplemental Report #2 for St. Francis Healthcare Foundation of Hawaii, for Reporting Quarter End Date 9/30/2014. Submitted by St. Francis, 2014.

HCIA Supplemental Report #3 for St. Francis Healthcare Foundation of Hawaii, for Reporting Quarter End Date 9/30/2014. Submitted by St. Francis, 2014.

HCIA Supplemental Report #4 for St. Francis Healthcare Foundation of Hawaii, for Reporting Quarter End Date 9/30/2014. Submitted by St. Francis, 2014.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by St. Francis, 2015.

HCIA 11QR Quarterly Report for St. Francis Healthcare Foundation of Hawaii, for Reporting Quarter End Date 3/31/2015. Submitted by St. Francis, 2015.

Sutter Health Corporation

This chapter updates NORC's evaluation of the Sutter Health Corporation's Advanced Illness Management (AIM) intervention. AIM offers care coordination among hospital, home health, physician's office, and hospice for seriously ill patients within the Sutter Health system, delivered by interdisciplinary teams of nurses and social workers. AIM targets patients with a high burden of disease, who meet criteria for hospice services but are not enrolled in hospice, have experienced rapid or significant functional or nutritional decline, have recurrent and unplanned hospitalizations, or who are considered by providers likely to die in the next 12 months. The goal is deliver a consistent set of patient engagement and care coordination services across multiple sites that ensure warm handoffs among hospitals, physician offices, home health agencies, and hospices for seriously ill enrollees and their caregivers. Sutter Health has been involved in care coordination for persons with multiple chronic conditions (MCC) for many years and piloted AIM in 2009 at its Sacramento location. The HCIA funds have been used to replicate and scale up a revised AIM model across the Sutter Health system.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness and on findings from NORC's survey of workforce and training experience.

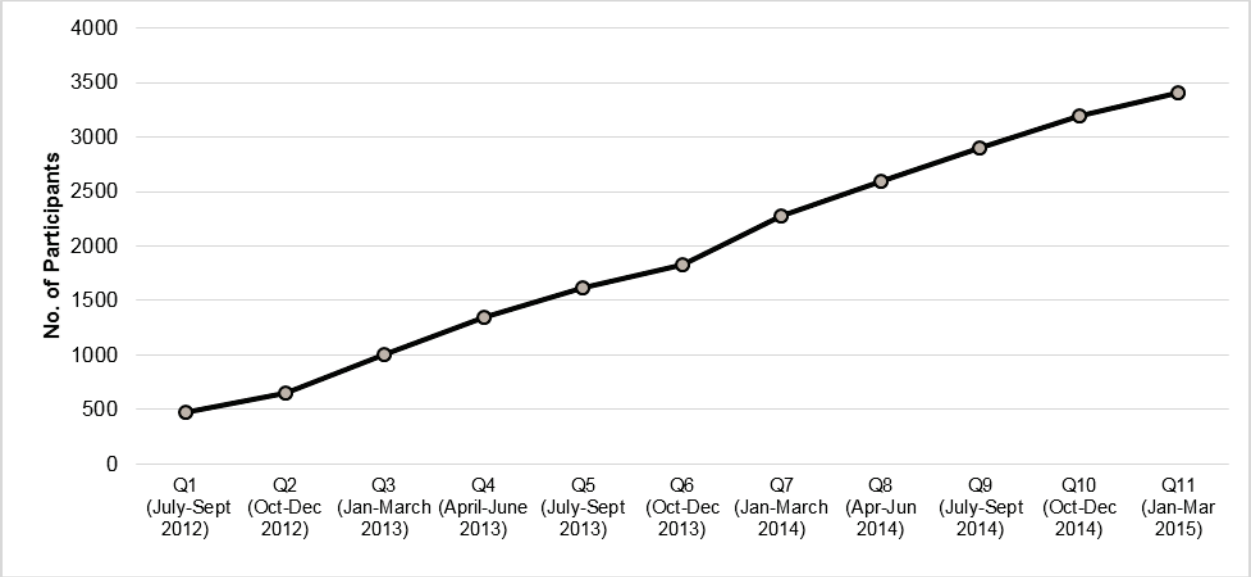
Overview of Awardee

CMMI Category for Awardee:	Integrated Health System
Funding Amount:	$13,000,000
Launch Date:	7/1/2012
State(s) Where Located:	California

Patients Targeted and Served

Self-reported data from Sutter Health provides enrollment data by HCIA reporting quarter, as shown in Exhibit AIM.1. Enrollment has increased steadily over time. During the most recent quarter for which data are available (January 1 through March 31, 2015), AIM served 3,410 participants. As of March 31, 2015, the program had served a cumulative total of 8,340 unique participants since program launch, 80 percent of the total number projected to be served over the three years of the HCIA-funded program (10,738 participants).

Exhibit AIM.1: Total Number of AIM Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Two-thirds are over 75 years of age (66 percent), with the remainder about equally divided between elders aged 65 to 74 years (17 percent) and adults aged 26 to 64 years (16 percent).
- Gender: Over half are female (59 percent).
- Racial and Ethnic Identity: Almost two-thirds are identified as White (64 percent), with 11 percent identified as Black or African American, about six percent as Hispanic or Latino, and about 10 percent as Asian.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit to AIM (May 2014) and our first annual report (September 2014), Sutter Health has continued to successfully scale up its evidence-based AIM model, enriching the mix of planning and coordination services offered to enrollees, launching additional sites toward meeting an initial target of 14 locations, and increasing its organizational capacity for self-monitoring. On NORC's second site visit, we observed implementation at rural (Concord) and urban (San Mateo/Santa Clara) sites not visited earlier, interviewed the Yuba site team one year post-launch, and were briefed on the launch of all new sites since NORC's previous visit (Marin and Lake County, as well as Santa Clara). In addition, the second site visit focused on Sutter Health's development of new documentation and a data warehouse to support AIM, new on-call services and greater involvement in advanced care planning, and AIM plans for sustainability.

Notable updates in our understanding of the AIM intervention are as follows:

Communications and Health IT. In 2012, Sutter Health launched its HCIA-supported expansion of AIM with four health IT systems, including Home Care Home Base (home health), Epic (hospital), Midas, and

Microsoft Access (HCIA reporting); due to lack of interoperability across providers, AIM has relied on faxes to share information. In 2015, Sutter Health revamped its health IT platform, creating a Pillar-Focused Care note that organizes patient information according to the AIM rubric and that is usable across platforms, including Epic. A second important development has been the launch of a data warehouse that allows the central program office to more easily collect program data from sites and generate actionable reports on a timely basis; together with access to Medicare claims data, also gained in the past year, the data warehouse has strengthened Sutter Health's organizational capacity to monitor implementation and successfully make mid-course adaptations.

Patient and Caregiver Engagement. Patient engagement and support to caregivers are carried out by registered nurses and social workers, both by telephone and in-person in hospital and home settings. Engagement begins with the telephone enrollment appointment and is intensified through a series of 4 to 8 weekly home visits post-discharge and access to telephone-based support after hours, on weekends, and during periods when a patient is not receiving home visits. AIM organizes tasks around a "Five Pillars of Care" rubric that includes identifying patient goals to guide the care plan and completing advanced care planning (e.g., POLST), managing symptoms using Stop Light tools and teach-back for the patient or caregiver, reviewing medications, creating and maintaining a personal health record, and reinforcing patient or caregiver follow up with primary and specialty care. A customized pillar-focused note documents the delivery of services, both in Epic (shared across hospitals, Sutter-affiliated providers, and the after-hours triage telephone service) and in the Home Care Home Base EHR used by Sutter home health agencies; the note is shared with the patient's referring or primary care provider.

To monitor the efficacy of patient engagement and caregiver supports, Sutter Health fields a 10-item, telephone patient satisfaction survey twice during a patient's first year and annually thereafter. In addition, the awardee measures the percentage of patients who have a completed advanced care plan in their EHR, prior to or within 90 days of enrollment.

Fidelity, Adaptability, and Self-Monitoring. As noted above, Sutter Health's investment in documentation and data analytics represents an improvement in organizational capacity to achieve near-real time monitoring and guide change based on learning from such feedback. In addition, Sutter Health has responded to stakeholder and enrollee requests to launch an after-hours triage component, available 24 hours per day, 7 days per week. The triage service uses a nurse help line based in Utah, with access to the Sutter Health EHR and the ability to make referrals to physicians or hospital, as well as to make regular check-ins (tuck-in calls) at a provider's request. Feedback has also motivated the AIM intervention to a new focus on boosting rates of advanced care planning conversations, as well as completion of related documents stored as part of the EHR.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of two analyses for Medicare fee-for-service (FFS) beneficiaries in Sutter Health's AIM program. One is a time series analysis for beneficiaries enrolled for one or more quarters before and after implementation of the AIM program and the second (a cross-

sectional analysis with a comparison group) of beneficiaries who died or elected to enter hospice (end-of-life analysis). We evaluate the effects of the AIM program on measures of health care utilization and cost in both cases. For the end-of-life analysis, we construct a comparison group of Medicare beneficiaries who live in similar geographic areas, who also died or received hospice care during the same time period (2013 and 2014). We find that, in the last 30 days of life, the AIM program is associated with statistically significant reductions in hospitalizations and total costs of care relative to a comparison group.

In addition, we present results of an analysis of trainee experience with the AIM program from NORC's survey of AIM clinical staff with a variety of job functions, responsibilities, and educational backgrounds. Staff report overall satisfaction with training, supervision, teamwork, and job tasks.

Claims-Based Analysis

Measures. Findings are presented for five measures:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- Total quarterly cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries

Research Questions. For each measure, we address the following research questions:

- What are the average differences in health care utilization outcomes among participants enrolled in the AIM program, before and after implementation of AIM, after adjusting for potential confounders?
- Among participants who died or elected hospice after enrollment into the AIM program, what are the average differences in utilization outcomes between AIM participants and a comparison group in the last 30 days of life, after adjusting for differences between the two groups?

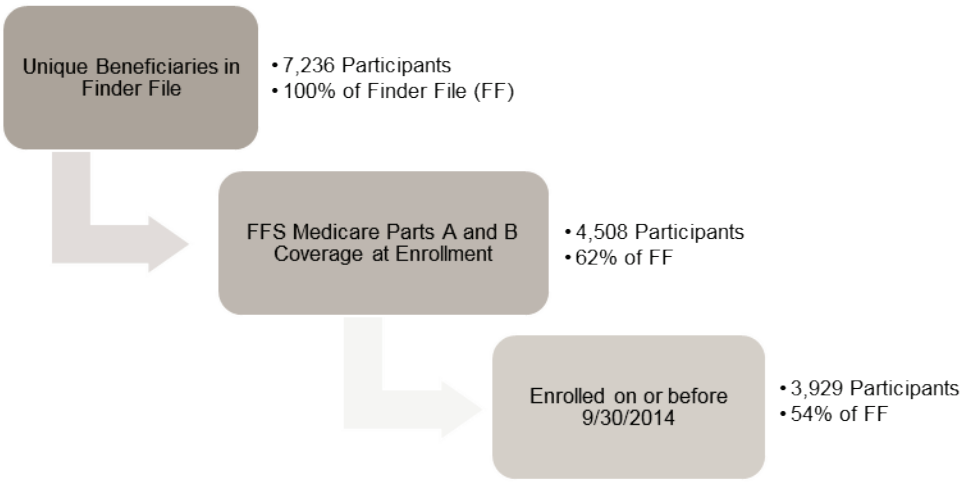
Analytic Approach. We present findings from two analyses:

- A time-series analysis for Medicare FFS beneficiaries enrolled for one or more quarters before and after implementation of the AIM program. Medicare FFS beneficiaries comprise 62 percent of the 7,236 participants included in Sutter Health's finder file.
- A cross-sectional end-of-life analysis (difference-in-differences or DID) comparing participants in AIM who died after program enrollment to a comparison group who died in the same period. This analysis allows us to explore the degree to which AIM achieves its core objectives of decreasing cost and utilization, and improving quality of care, in the final months of life.

Finder File and Creation of Analytic Sample. Sutter Health provided an updated finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate

outcome measures.[124] As shown in Exhibit AIM.2, the finder file identified 7,236 participants, of which 4,508 were enrolled in FFS Medicare during the month of enrollment in the AIM program. We restricted our analyses to 3,929 participants who enrolled in AIM on or before September 30, 2014, to ensure that they had at least one quarter of follow-up. The analytic sample for the cross-sectional end of life analysis includes 2,307 participants who died or elected hospice care after enrolling in the AIM program.

Exhibit AIM.2: FFS Medicare Beneficiaries Identified Through AIM Finder File



Analysis 1: Impact of the AIM Program, Time-Series Analysis

Model. We employ time-series analyses to estimate the change in outcomes for program participants in the period *before* and *after* enrollment in the program. In the two time periods, we use repeated measures on program participants, obtained per quarter, before or after enrollment in the program. We use population-averaged logistic models with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we use a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \beta Participant_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the tth *Time* period. *Time i*s specified an indicator variable denoting the post-intervention period and $\boldsymbol{\alpha}$ is the effect observed after enrollment in the program; *Participant* is a vector of participant demographic and clinical variables; and $\boldsymbol{\beta}$ is a vector of effects corresponding to the relevant participant variables in the models. For more detailed information on logistic and GEE models, please refer to Appendix C. In our models, $\boldsymbol{\alpha}$ is the effect of the program on outcomes over the entire post-intervention period.

[124] Medicare claims are available through December 31, 2014, for the analyses in this report. We use September 30, 2014 as the cut-off date to account for the 90-day claims runoff.

Results

Descriptive Characteristics. Exhibit AIM.3 displays the descriptive characteristics of AIM's Medicare FFS beneficiaries, including demographics, number of other chronic conditions, prior utilization, and reason for initial Medicare enrollment. Of the 3,929 participants in the analytic file enrolled for at least one quarter, the average number of quarters of enrollment is 3.3, with longest enrollment being 21 quarters. The majority of these Medicare participants are female (55 percent) and White (78 percent). Approximately 22 percent of them are also Medicaid beneficiaries (dually enrolled) and 80 percent gained Medicare coverage at age 65 years.

Exhibit AIM.3: Descriptive Characteristics for AIM Program Enrollees

Variable	Value
Number of Persons	3,929
Mean Number of Quarters Enrolled [Range]	3.3 [1-21]
Gender % (N)	
Female	55.3 (2,174)
Age Group % (N)	
<70 years	19.5 (764)
70-74 years	11.2 (440)
75-79 years	13.0 (510)
80-84 years	16.6 (653)
≥85 years	39.8 (1,562)
Race/Ethnicity % (N)	
White	78.5 (3,083)
Black	9.2 (360)
Asian	5.6 (218)
Hispanic	2.7 (107)
Other	4.1 (161)
Dual Eligibility % (N)	
Dually Enrolled	21.6 (849)
Coverage Reason % (N)	
Age	79.7 (3,132)
Disability	19.1 (749)
ESRD	0.6 (22)
ESRD and Disability	0.7 (26)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (Standard Deviation)	3.7 (1.9)
Mean Count of HCCs (SD)	5.4 (3.2)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$57,407 ($73,580)
Hospitalizations per 1,000 (SD)	1904 (2128)
ED Visits per 1,000	1408 (2563)

Time Series Analysis. Results presented in Exhibit AIM.4 represent the differences in utilization and cost for AIM program participants before and after enrollment.[125] Utilization outcomes are presented as the adjusted marginal difference from the population-averaged logistic models for the number of

[125] Adjustment factors include post-intervention indicator, age category, gender, race/ethnicity, disability indicator, dual eligibility and HCC score.

participants with the outcome, while total cost of care is the adjusted marginal difference in cost from the gamma distribution GEE model.

The model-based estimates indicate the following, relative to the pre-intervention period:

- Utilization Measures: We observe increases in hospitalizations (3.5 per 1,000 beneficiaries) and ED Visits (6.0 per 1,000 beneficiaries), although neither change reaches statistical significance.
- Cost: We observe a significant increase of $3,183 in total cost of care per patient per quarter in the post-intervention period.
- Quality of Care Measures: We observe a significant decrease in ACS hospitalizations (-8.6 per 1,000 beneficiaries and a significant increase in 30-day readmissions (29.7 per 1,000 beneficiaries).

Exhibit AIM.4: Utilization and Cost Differences for AIM Participants before and after Implementation

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	3.5 [-5.0, 12.0]
ED Visits (Likelihood per 1,000 Beneficiaries)	6.0 [-2.0, 14.0]
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	**29.7 [24.5, 35.0]*** **
Total Quarterly Cost of Care per Beneficiary ($)	**$3,183 [$2,708 , $3,659]*** **
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	**-8.6 [-13.4, -3.8]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Analysis 2: End-of-Life Cross-Sectional Analysis

Model. To evaluate the effect of the AIM intervention on health care utilization outcomes in the last 30 days of life among beneficiaries at the end of life, we construct an index date for AIM participants and comparators that was one year prior to date of death or admission to hospice care. Health care utilization variables and FFS enrollment in the year prior to this index date are used in analyses. We model dichotomous outcomes of inpatient admission and ED visits using logistic regression. Total cost of care is modeled as a continuous variable using GLM with a gamma distribution and log link.

Results

Descriptive Characteristics. Exhibit AIM.5 displays the descriptive characteristics of Medicare beneficiaries at the end of life in the participant and comparison groups. We compare the two groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) and a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition). The intervention and comparison groups each contain 2,307 members.

Overall, AIM participants and the comparison group are similar in age, race, gender, disability eligibility, HCC score, and ED visits, total cost of care and FFS enrollment in the year prior to the index date. AIM

participants have a slightly lower prevalence of Hispanic ethnicity and eligibility by reason of end-stage renal disease than do comparators.

Exhibit AIM.5: Descriptive Characteristics for the AIM and Comparison Group Beneficiaries at End of Life

Variable	Sutter End-of-Life Analysis	
	Treatment	Comparison
Number of Beneficiaries	**2,307**	**2,307**
Age % (N)		
<70 years	18.7 (431)	18.6 (429)
70-74 years	10.9 (252)	10.8 (249)
75-79 years	12.8 (296)	13.3 (307)
80-84 years	15.1 (349)	15.4 (355)
≥90 years	42.4 (979)	41.9 (967)
Race/Ethnicity % (N)		
White	78.9 (1,819)	77.6 (1,790)
Black	8.9 (205)	8.9 (206)
Other	12.3 (283)	13.5 (311)
Hispanic***	8.2 (190)	10.7 (247)
Gender % (N)		
Female	54.0 (1,245)	53.8 (1,241)
Original Coverage Reason		
Age	81.8 (1,886)	81.3 (1,876)
Disability	17.9 (412)	17.7 (409)
ESRD***	0.8 (19)	1.9 (43)
Hierarchical Condition Categories (HCC)		
Total Community HCC (Standard Deviation)	4.42 (2.18)	4.44 (2.33)
Mean Utilization and Cost in Quarter Prior to Program Enrollment		
Hospitalization per 1,000 (SD)***	771 (1,320)	644 (1,206)
ED Visits per 1,000 (SD)	788 (1,771)	707 (2,088)
Total Medicaid Cost (SD)	$27,663 ($47,193)	$26,957 ($44,491)
No. of Days FFS (SD)	356 (47)	356 (49)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

End-of-Life Analysis. To compare participants in AIM who died after program enrollment with other beneficiaries not enrolled in AIM who died in the same period, we restrict the AIM cohort to those who died or elected hospice care, and construct a comparison group. This analysis allows us to evaluate the degree to which AIM achieves its core objectives of decreasing cost and utilization, and improving quality of care, in the final months of life.

Comparison Group. We identify two comparison counties (Alameda and Santa Clara) in CA similar to the treatment counties (Yolo/Sacramento, Placer/El Dorado, Sonoma, San Mateo, Solano, Alameda, Contra Costa, and San Francisco), based on a set of county-level variables that include the number and characteristics of Medicare beneficiaries, Medicare Advantage penetration rate, hospice use, hospital and hospice capacities, readmission rate, ED visit rates, and per capita costs. See Appendix C for more details. We then create a comparison pool by selecting Medicare beneficiaries in Alameda and Santa Clara

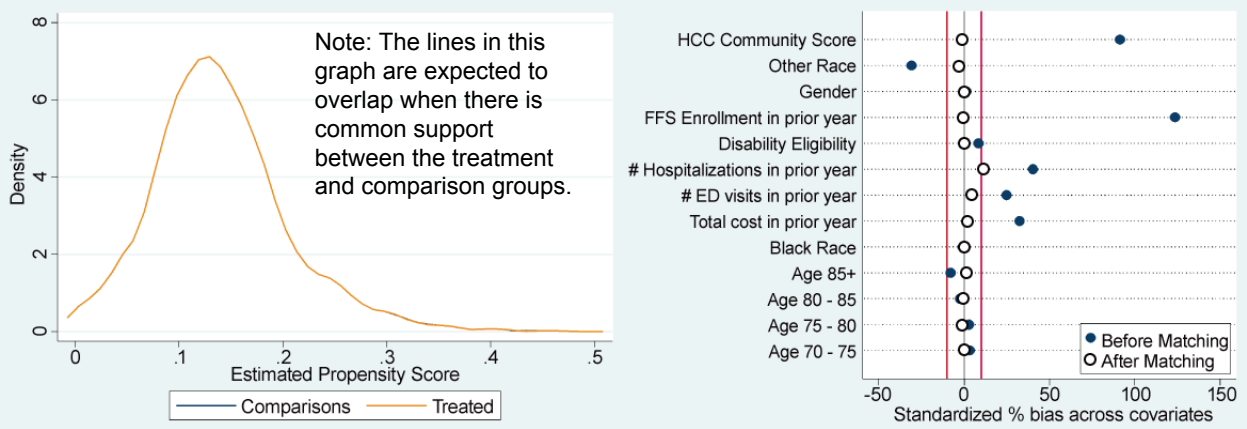
counties who were not enrolled in the AIM program and who died between 2013 and 2014. In Alameda, as well as other counties, we ensured that AIM participants were not selected as comparisons.

From the larger pool or sampling frame, we identify a smaller, matched subset of comparators, all of which have propensity scores similar to those of the intervention group. To find suitable comparisons for the 2,307 AIM participants, we used propensity score matching, which allows us to consider intervention and comparison group members to be equally likely to be part of the intervention group (as if randomly assigned), despite differences in demographic, health and other measurable characteristics or covariates. Statistical techniques adjust for known sources of bias inherent to observational studies (e.g., differences in the covariates). Logistic regression is used to estimate a propensity score, or likelihood of being in the intervention group, given each individual's measured characteristics, for each member of both the intervention and comparison groups. The final propensity score models included age, race, disability eligibility, HCC score, FFS enrollment in the year prior to index date, and total cost of care in the year prior to index date. See Appendix C for details about propensity score matching.

Exhibit AIM.6 presents common support and balance in covariates across intervention and comparison groups.

- After matching, we observe nearly identical overlap in the density curves for propensity score in the intervention (shown in red) and comparison (shown in blue) groups, indicating equivalent propensity scores in both groups.
- In the matched sample we attain balance in measures of age, gender, race, ethnicity, disability eligibility, HCC risk score, FFS enrollment in the year prior to index date, number of ED visits in the year prior to index date, and total cost of care in the year prior to index date. We are not able to achieve balance in number of hospitalizations in the year prior to the index date; however the balance chart suggests that after matching, the balance in this variable between the two groups was greatly improved.

Exhibit AIM.6: Test of Common Support and Covariate Balance



DID Analysis. Results presented in Exhibit AIM.7 assess the impact of the awardee's program in the last 30 days of life. The estimates of differences between the intervention and comparison groups during this

period are unadjusted, as we are able to attain sufficient balance in covariates through propensity score matching

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: The AIM program is associated with 88 fewer beneficiaries per 1,000 with hospitalizations in the last 30 days of life, a statistically significant result. The program is also associated with 16 fewer beneficiaries per 1,000 with ED visits in the last 30 days of life, an estimate that did not reach statistical significance.
- Cost: The AIM program is associated with a statistically significant lower cost per beneficiary of $6,047 during the last 30 days of life.

Exhibit AIM.7: Differences in Utilization and Cost between AIM Program Participants and Comparators in the Last 30 Days of Life

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**-88 [-116, -59]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	16 [-5, 37]
Total Cost of Care per Beneficiary ($)	**-$6,047 [-$7,158, -$4,935]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. Key limitations of this analysis are that 1) without Medicaid data, only 62 percent of program participants are included in the analysis, likely biasing the results, and 2) we do not have a comparison group for the living AIM program participants and thus we cannot compare these results to a similar population that does not receive the AIM intervention.

Survey of Workforce Trainee Experience

NORC collaborated with Sutter Health to tailor the questionnaire for their intervention, which included site-specific questions requested by the awardee. The sample included 172 AIM program clinical staff. Data collection began on May 14, 2015, and ended on June 5, 2015.

Results

Description of Survey Respondents. Of the 172 staff invited to participate in the survey, 125 AIM employees completed the NORC workforce survey (73 percent response rate). A total of 42 percent of respondents were employed by Sutter Health or an AIM project partner prior to the start of the AIM project; 58 percent were new hires. Respondents were mostly female (83 percent) and White (49 percent) or Asian (22 percent), with an average age of 46 years and an average of 13 years' experience working directly with patients.

Exhibit AIM.8 presents information about the job function, tasks, and education level of the respondents. Nurses are central to the AIM intervention and are the single largest group of respondents (64 percent), followed by a small group of social workers (13 percent). Approximately half of respondents have earned

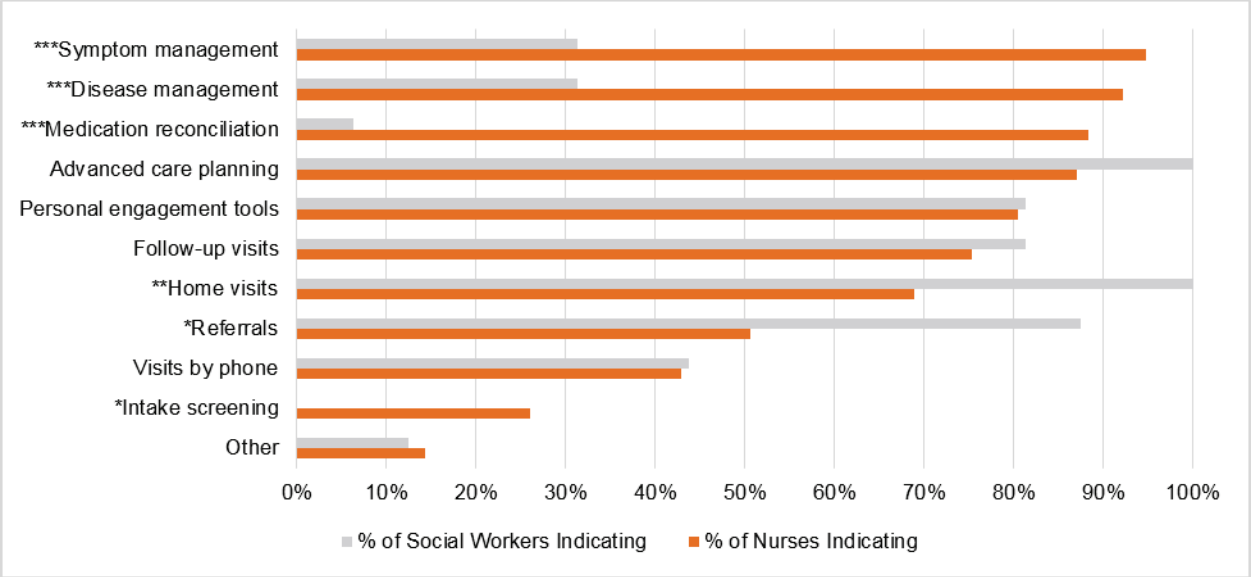
a 4-year college degree (52 percent) and a quarter of respondents have attained at least a master's degree (25 percent).

Exhibit AIM.8: Characteristics of Sutter Workforce Survey Respondents (N=125)

Variable	Value
Staff Type/Job Function % (N)	
AIM Team Care Coordinator	12.0 (15)
AIM Care Liaison (Nurse)	12.8 (16)
Office-Based Care Manager (Nurse)	0.8 (1)
AIM Clinical Intake Specialist	0.8 (1)
AIM Tele-Support Nurse	6.4 (8)
AIM Home Health RN Care Coordinator	24.8 (31)
AIM Home Health Licensed Visiting Nurse-Revisit Nurse	4.0 (5)
AIM Home Health MSW	6.4 (8)
AIM Transitions RN Care Coordinator	13.6 (17)
AIM Transitions MSW	6.4 (8)
Other	12.0 (15)
Highest level of Education % (N)	
High school or GED	0.0 (0)
Some college or trade school	6.4 (8)
Certified Nurse Assistant	0.0 (0)
College graduate	52.0 (65)
Master's, clinical	17.6 (22)
Master's, non-clinical	5.6 (7)
Doctorate (medicine, nursing, dentistry, social work, clinical psychology)	1.6 (2)
Other	10.4 (13)
Unknown	6.4 (8)

AIM staff perform many important and varied tasks; Exhibit AIM.9 provides a breakdown of how the nurses and social workers report spending their time. Nurses report performing significantly more symptom and disease management, medication reconciliation, and intake screening, while social workers report performing significantly more home visits and referrals.

Exhibit AIM.9: Activities Performed by Social Workers and Nurses at AIM Sites



NOTE: *p<.05, **p<.01, ***p<.001.

Development and Training

Participants report that each of the formal trainings was useful.

- The 4-Day Training: Ninety-six (96) percent of respondents reported receiving this training and all found it to be moderately to very useful.
- A total of 90 percent of respondents reported receiving training for use of the EHR system, and of those that did, 95 percent indicated it was moderately to very useful, while the other 5 percent indicated it was not at all useful.

Most participants also found informal training useful.

- Eighty-nine (89) percent of respondents report having "informal conversation as needed" and of those that did, almost all indicated they were moderately or very useful (98 percent); the other two percent indicated they were not at all useful (2 percent).
- Of the respondents that indicated participating in weekly team meetings (90 percent), almost all indicated they were moderately or very useful (96 percent), though a small percentage indicating they were not at all useful (4 percent).
- Preceptors/Preceptorship: 69 percent of staff report having this training relationship to another staff member. Almost all (97 percent) find it to be moderately to very useful, while the other three percent indicate it was not at all useful.

Staff judged symptom management and preceptorships to be the most useful trainings.

- In general, participants rank symptom management (19 percent) and preceptorships (19 percent) as the most useful trainings provided by the AIM program, followed by the weekly team meetings

(13 percent) and trainings on roles and team care (10 percent) and advanced care planning (10 percent).

- Nurses and social workers differ significantly in what trainings they find most useful ($\chi 2$ (1) = 22.18, p <.01.). Social workers (n=15) indicate that trainings in advance care planning (27 percent) and motivational interviewing (27 percent) are most useful, while nurses (n=77) indicate that preceptorships (26 percent) and symptom management trainings (22 percent) are the most useful.

Other findings relate to the training process overall:

- Most respondents say that trainings were worth the time invested (83 percent) and taught useful skills (88 percent).
- Respondents generally affirm that the trainings prepared them for various aspects of their jobs on the AIM project (83 percent**),** especially to prepare them to implement the services as intended (87 percent) and meet their patients' needs (86 percent). Most respondents agree that the trainings prepared them to work as a team (82 percent) and use the technology needed on the job (76 percent).

Workforce Deployment: Stress

Exhibit AIM.10 presents information on how respondents reported the balance between stress and reward levels in their work. Each cell in the table presents the percentage of respondents who reported both a given stress level and a given reward level. Cells are shaded in darker orange colors where a higher proportion of respondents reported the same combination of stress and reward.

AIM staff reported moderate to high levels of stress while also experiencing the work as rewarding.

- When asked if their work-related stress had increased, decreased, or stayed the same compared to their work before AIM, 46 percent note an increase, 26 percent a decrease, and 22 percent indicate no change.
- When asked to assess the balance between stress and reward in their role with AIM, almost one-third of respondents (30 percent) describe a moderate level of work-related stress, paired with a relatively strong sense of reward.

Exhibit AIM.10: Balance between Stress and Reward, AIM Trainees

		Reward Level (% Reporting)		
		High	**Moderate**	**Low**
Stress Level (% Reporting)	**High**	15.2	17.6	9.6
	Moderate	30.4	11.2	4.0
	Low	2.4	4.0	0.0

Workforce Deployment: Teamwork and Support

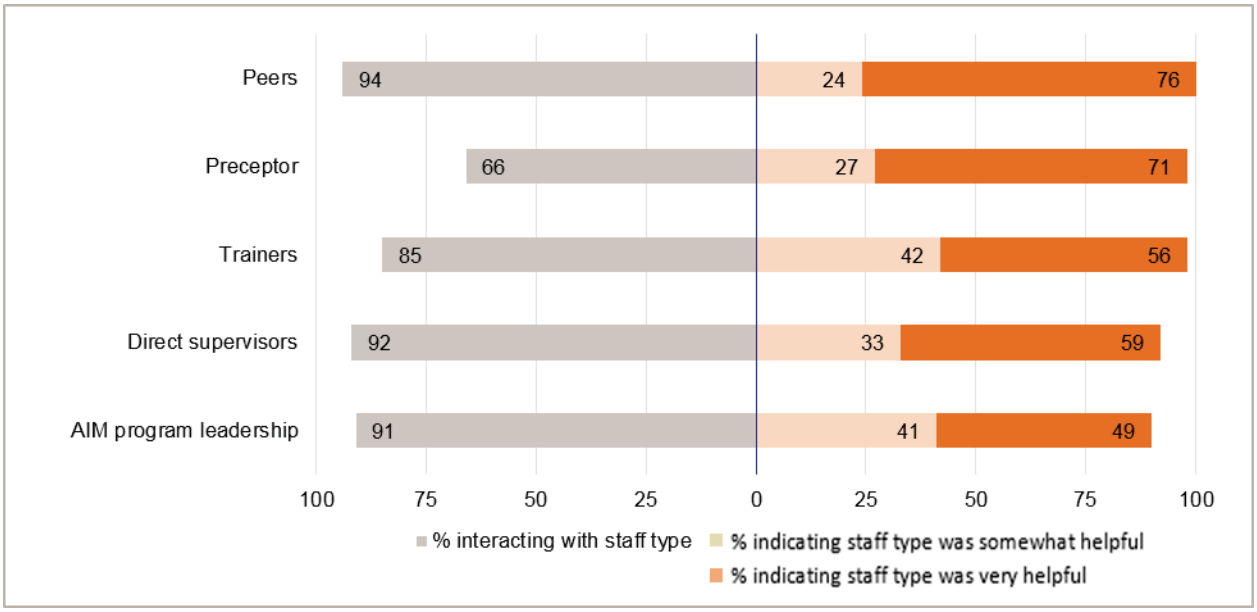
AIM Staff report having an impact on clinical decision making and quality of care.

- Most respondents say that the information they provide to their team had an impact on clinical decision making (84 percent) and that their participation in team-based care had a positive impact on patient quality of care (94 percent).

Trainees report that AIM staff have been helpful.

- Contacts with peers, preceptors, and trainers are the most likely to be considered helpful, although contact with preceptors is mentioned less frequently. See Exhibit AIM.11.

Exhibit AIM.11: Contact with Helpful AIM Staff



Most respondents have received useful support and feedback from their supervisors, although only some get feedback that compares their performance with their peers.

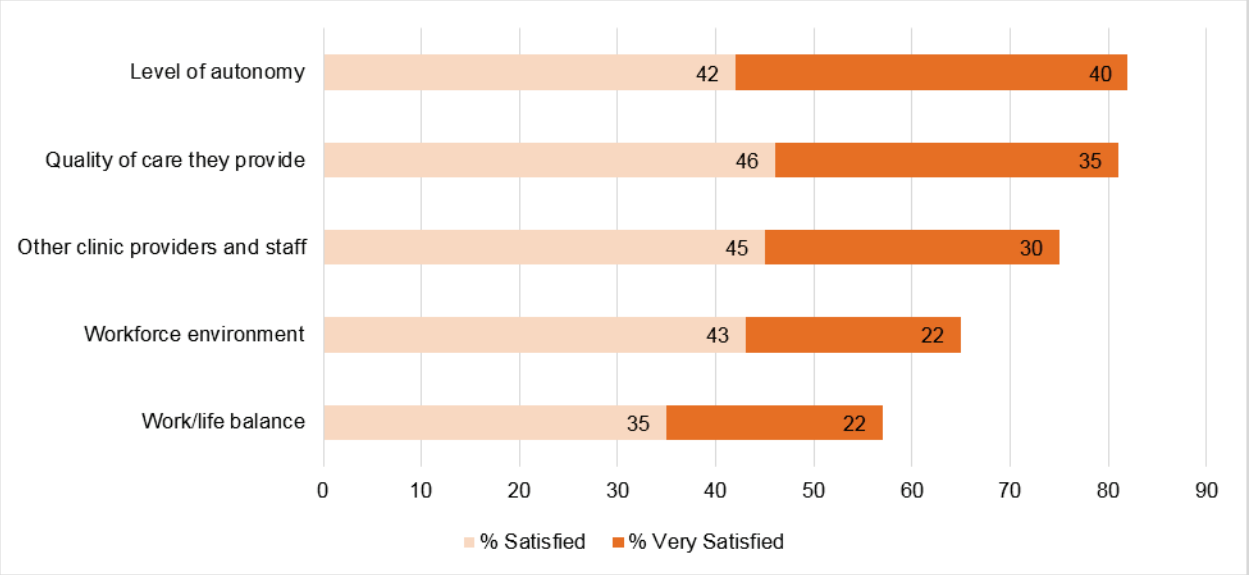
- Three-quarters of respondents agree or strongly agree that they get the help and support they need to do their job, while 10 percent neither agree nor disagree, and seven percent disagree or strongly disagree.
- Over 80 percent of respondents indicate that their supervisors or managers provide suggestions and support on things they can improve and assist with problem solving or advice. Seventy (70) percent of respondents indicate that their supervisors or managers offer feedback on things they were doing well, while 22 percent indicate they did not get feedback on their performance.
- Eighteen (18) percent indicate that the feedback compares their performance to the performance of their colleagues, with seven percent noting that there weren't any other staff that shared their position.

Satisfaction

Overall, respondents were satisfied with many aspects of their jobs.

- While most respondents indicate they were satisfied with their job with the AIM project (79 percent), nine percent indicate they were neither satisfied nor dissatisfied, and six percent report being dissatisfied.
- Fifty-four (54) percent of respondents noted that they wanted to stay at their job in the next year, a general measure of satisfaction despite the fact that staff did not know whether the HCIA funding would be available for more than another month at the time of the survey.[126] Twelve (12) percent indicated that it was likely that they would leave within the year.
- Overall satisfaction (percentage reporting being very satisfied or satisfied) across five components of AIM work, varies markedly by component. The highest levels of satisfaction related to the level of autonomy and the quality of care provided to patients. See Exhibit AIM.12.

Exhibit AIM.12: Percent of AIM Trainees Feeling Satisfied with Various Aspects of Their Work



Summary

Claims-based Analysis. We find statistically significant increases in total cost of care and 30-day readmissions, and a significant decrease in ACS hospitalizations, for participants in the post-intervention period compared to the pre-intervention period. The program showed increases in hospitalizations and ED visits among participants in the post-intervention period, relative to the pre-intervention period, but these changes were not statistically significant. The frail condition of this population, and enrollment in the program being triggered by a hospitalization, help explain the increases in core measures in the post-intervention period. Our end-of-life analyses indicate significant decreases in hospitalizations and total

[126] Sutter's HCIA funding ended June 30, 2015.

cost of care, and a non-significant increase in ED visits among the AIM participants, compared to the comparison group.

In future reports, we plan to present results for a comparison group for AIM participants who remain alive at the time when data are gathered for analysis. This is challenging, however, as it is difficult to predict death within 12 months. Additional analyses could also be considered that examine whether training experiences or satisfaction differs by subgroups within the sample.

Workforce Survey. AIM respondents have a positive view of program trainings, both formal and informal, and judge preceptorships and symptom management trainings to be most useful. Respondents say that trainings were worth the time invested, taught useful skills, and prepared them for various aspects of their jobs on the AIM project. While AIM staff report moderate to high levels of stress, they also report experiencing the work as rewarding and feel that it improves quality of care and clinical decision making. They report being supported by their supervisors and find AIM staff to be helpful. Overall, AIM respondents indicate they are satisfied with their jobs, especially with the quality of care they provide to patients and the level of autonomy they are afforded.

Sustaining and Scaling the AIM Program. The awardee's sustainability plans cite the importance of receiving Medicare reimbursement for care coordination services currently funded by the HCIA. There is potential for these services to be financed in-house, through a global budgeting approach. With staff brought on internally and cross-trained among hospice and home health, and with the extensive attention given to high quality training that dovetails with ongoing training across Sutter Health and at each of its branch sites, AIM seems well situated to be sustained within the Sutter Health system. Sustainability will depend in part on the extent to which AIM protocols for warm handoffs and vehicles for interprofessional communication (case management software, addition of fields to Epic and home health EHR) are adopted across partner hospitals, affiliated provider practices, home health agencies, and hospices.

Sutter Health has robust sustainability plans in place for the AIM program, anchored in the organizational capacity and central leadership of the project and the Sutter health care system. Despite significant challenges posed by Stark and anti-kickback regulations that constrain coordinated, warm handoffs across care settings and providers, and ongoing instability in health care markets that can destabilize partnerships, Sutter has successfully managed a broad range of partners and stakeholders to implement AIM as planned. The awardee plans to sustain AIM at all 14 sites, using internal funds in the short-term (budget year 2016) and exploring additional revenue sources to support AIM in the long-term, for example, seeking expanded eligibility for the Medicare skilled home health benefit, to enable integration of care across the continuum.[127]

References

Berenson RA. *Challenging the Status Quo in Chronic Disease Care: Seven Case Studies*. California Health Care Foundation, 2006.

[127] Sutter Health did not apply for a no-cost extension of HCIA 1 funding for the AIM program.

"Chronic Care and Disease Managment Improves Health, Reduces Costs for Patients with Multiple Chronic Conditions in an Integrated Health System." AHRQ Innovation Exchange, updated 8/13/2014.

Ciemins EL, Stuart B, Gerber R, Newman J, Bauman M. "An Evaluation of the Advanced Illness Management (Aim Program: Increasing Hospice Utilization in the San Francisco Bay Area." *Journal of Palliative Medicine* 9#6 (2006): 1401-1411.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by Sutter Health, 2015.

HCIA 11QR Quarterly Report, for Reporting Quarter End Date 3/31/2015. Submitted by Sutter Health, 2015.

Montgomery AH. *Dignity-Driven Decision Making: What Is It and Why Is It So Important?* . National Academy of Social Insurance, 2014.

University Emergency Medical Services

This chapter updates NORC's evaluation of the University Emergency Medical Services (UEMS) Better Health through Social and Health Care Linkages beyond the Emergency Department (HealthiER) initiative. The HealthiER program aims to reduce non-urgent hospital emergency department use by adults age 18 and older who are enrolled in or eligible for Medicaid or Medicare and who live in Buffalo, NY. UEMS uses teams of community health workers to recruit participants at the Erie County Medical Center ED as well as affiliated hospital outpatient and community clinics, for the development of patient-directed service plans and coaching toward the achievement of one or more goals, including connection to primary care, over a period of months.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus in this report is on results from NORC's claims-based analysis of program effectiveness.

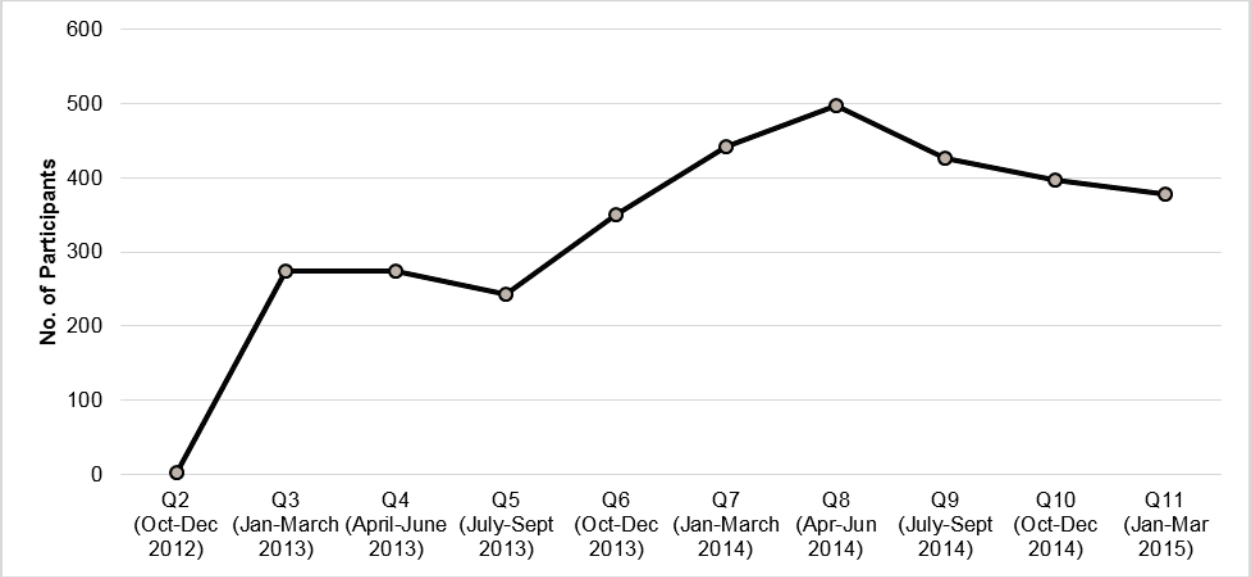
Overview of Awardee

CMMI Category for Awardee:	Emergency Medical Services (EMS) Provider
Funding Amount:	$2,570,749
Launch Date:	12/27/2012
State(s) Where Located:	New York

Patients Targeted and Served

Self-reported data from UEMS provides enrollment data by HCIA reporting quarter, as shown in Exhibit UEMS.1. The data show a general increase through Q8, followed by a more gradual decline through Q11. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 379 participants. As of March 31, 2015, the program had served a cumulative total of 1,610 unique participants since program launch, 67 percent of the total number projected to be served over the three years of the HCIA-funded program (2,400 participants).

Exhibit UEMS.1: Total Number of UEMS Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Most participants are adults ages 26 through 64 years (77 percent), followed by young adults ages 19 through 25 (16 percent), and elders ages 65 through 74 years (four percent).
- Gender: Just over half of participants are female (54 percent).
- Racial and Ethnic Identity: Most participants are identified as Black or African American (83 percent), 11 percent as White, and four percent as Hispanic or Latino.

Update: Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), UEMS has developed successful new referral relationships with two primary care clinics affiliated with Erie County Medical Center (Internal Medicine, Grider Family Medicine). At these two sites, the awardee has worked to integrate the CHWs into the workflow of the clinic and train clinic staff on an ongoing basis, fostering relationships between participants and primary care and offering HealthiER CHWs a working environment that is more consonant with their preventive care and holistic orientation. The HealthiER leadership team has also been closely involved with planning for New York State's Medicaid Delivery System Reform Incentive Payment (DSRIP) program, applying lessons learned from HealthiER to the creation of a revised program model that will be scaled at multiple hospital EDs in Western New York.

Communications and Health IT. The awardee uses multiple systems to manage and share data, including a dedicated care management tool (Circe) and the EHRs for Erie County Medical Center (MediTech) and referring outpatient clinics (Allscripts); for both Meditech and Allscripts, UEMS staff have the ability to read and add flags to existing data.

Patient and Caregiver Engagement. The HealthiER intervention is based on the idea that adults who are high utilizers of the ED often do so because of lack of access to primary care that reflects difficulties

navigating the local health care system and lack of knowledge about how to effectively manage their own health. Patient engagement, through one-on-one coaching and counseling, is the driver for the intervention. The idea is that a more knowledgeable, activated patient, focused on achieving their own objectives with respect to health, will make less use of the hospital ED, will receive higher quality clinical care, and will experience improved health, functioning, and wellbeing.

Patient engagement starts with recruitment of participants from the Erie County Medical Center (ECMC) emergency department and from referrals by local primary care practices, including ECMC-affiliated outpatient clinics. The intervention itself consists of a series of one-on-one meetings between a community health worker (CHW) and a participant. At these meetings, which take place every week or two, the CHW and participant work to identify one or more health goals, the steps to take toward achieving these goals, and progress made in completing the steps. CHWs are expected to be in weekly contact with each of their participants. For each participant, the intervention is anticipated to run for three to four months. The CHWs do not use a set curriculum but, rather, tailor their counseling to the specific needs of their participants.

CHWs are the key intervention staff involved in patient engagement. They are trained through a formal classroom-based series of lectures and interactive sessions, based on a written curriculum. They are tested for competency in skills and knowledge gained through the training, both through written testing and through observation by supervisors, who are master's level social workers.

NORC has very limited data to date on participant satisfaction from our site visit; while our focus group with HealthiER's community health workers and project leadership offered many observations about effectiveness, firsthand data are limited to participant focus group findings shared with NORC by an independent, external evaluator (University of Colorado) and to related survey data collected by UEMS that we anticipate will be shared with our team, including baseline and follow up administration of a patient activation measure (PAM). A number of contextual factors moderate the success of patient engagement for UEMS participants, including the social determinants of health (e.g., access to transportation, housing, food, employment) that also influence access to health care; the efficacy of the CHWs, reflecting their ability to connect through shared backgrounds and experiences with participants as well as the effectiveness of training, and the capacity of HealthiER to lower barriers to care related to financing and communication across providers.

Fidelity, Adaptability, and Self-Monitoring. Since program launch, UEMS has maintained the core components of the HealthiER intervention, while adapting staff training, targeting and patient recruitment strategies, and relationships with partners in light of implementation experience. After an initial round of community health worker training was deemed to be inadequate in preparing staff for daily work with participants, UEMS redesigned the training process to be more experientially based and conducted a second round of CHW hiring and retraining. Well into the three year implementation period, UEMS actively worked to create new referral relationships with primary care clinics, responding to feedback that CHWs did not feel professionally prepared to operate amid the traumatic circumstances of an ED. And as Medicaid payer reforms have continued to change during the course of implementation, UEMS has successfully negotiated relationships with Medicaid Health Homes and their sponsoring Medicaid

managed care health plans, to clarify working relationships and objectives around the use of CHWs for patient recruitment and care management.

The presence of an external rapid cycle evaluation team from the University of Colorado, supported by a local community foundation, as well as the involvement of a medical anthropologist affiliated with ECMC, has enabled the awardee to mature quickly, using data gathered and analyzed by the University of Colorado to made adjustments and test new strategies on a weekly basis. The University of Colorado has advised UEMS on self-monitoring, which includes baseline and follow up assessment of community health worker interactions with clients, participant satisfaction surveys, and measures of participant health and functioning,

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicaid beneficiaries served by the HealthiER initiative from January 2011 through December 2013. We use a comparison group of Medicaid beneficiaries aged 18 years of age and older who reside in Utica or Rochester NY zip codes areas. Comparators are also limited to those who live in the community, had an emergency department (ED) visit in 2012, and at least two additional ED visits in the previous 12 months. We find that, over a period of four quarters of program enrollment (through December 2013), the HealthiER program was associated with a greater decrease in beneficiaries with ED visits (expressed as 207 fewer per 1,000 beneficiaries) and $1,072 lower costs per Medicaid beneficiary relative to the comparison group. The decline in beneficiaries with hospitalizations was likewise greater for HealthiER participants than for comparators but did not reach statistical significance.

Measures. Findings are presented for three of four core measures, and one quality measure:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits, per 1,000 beneficiaries
- Total quarterly cost of care per beneficiary
- Practitioner visit follow-up within 7, 30 and 90 days of ED discharge, per 1,000 beneficiaries

New York Alpha-MAX data limits our ability to measure ambulatory care sensitive (ACS) hospitalizations, and thus we are not able to evaluate the effects of the HealthiER program on this core measure.

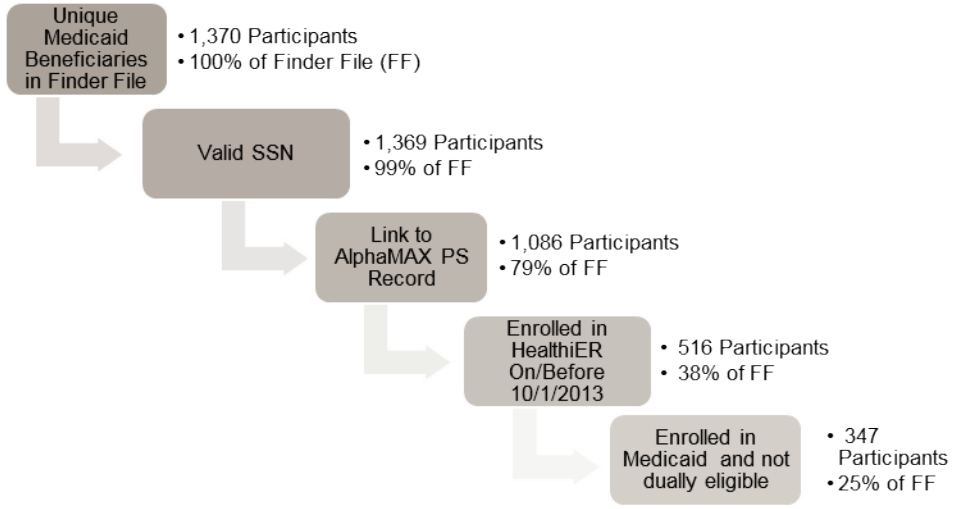
Research Question. For each measure, what are the average differences in the change in the measure pre and post implementation, for Medicaid beneficiaries served by HealthiER, relative to the comparison group, adjusting for differences in the two populations?

Analytic Approach. We specify and employ a DID model, comparing the experiences of participants in UEMS's HealthiER program with those of a comparison group in the pre- and post-intervention periods. Due to the availability of Alpha-MAX data (through 2013), only HealthiER participants enrolled prior to

October 1, 2013, could be included in analyses to ensure at least one quarter of follow-up time. These comprise 25 percent of all HealthiER participants.

Finder File and Creation of Analytic Sample. UEMS provided a finder file of 1,370 unique program participants and enrollment dates, enabling us to use Alpha-MAX Medicaid claims for these beneficiaries to calculate outcome measures.[128] As shown in Exhibit UEMS.2, the finder file included 1,370 unique program participants; 1,369 had a valid social security number (SSN). Of these, we succeeded in linking 1,086 participants to Alpha-MAX records, and 516 participants were enrolled in the HealthiER program before December 31, 2013. Ninety-two (92) participants were excluded because they were not enrolled in Medicaid at the time of enrollment into HealthiER. Another 77 participants were excluded because they were dually eligible for Medicaid and Medicare, and reporting on these beneficiaries' total cost of care may differ systematically. This yielded a final sample of 347 Medicaid beneficiaries for the HealthiER program in the post-intervention period.

Exhibit UEMS.2: Medicaid Beneficiaries Identified Through UEMS Finder File



Comparison Group. We use Alpha-MAX to identify a pool of Medicaid beneficiaries, aged 18 years and older, residing in Utica or Rochester zip code areas. We chose other upstate New York urban areas for the comparator pool because of the concern that the HealthiER program may have saturated the population of Medicaid enrollees in the Buffalo area. The comparator pool was Medicaid beneficiaries in Utica or Rochester who had an ED visit in 2012; which we set as the index date, and then required that these ED users also had at least two other ED visits in the year prior to their index date. This pool of potential comparators consists of 14,086 beneficiaries.

From this sampling frame we identify a smaller, matched subset. To find suitable comparisons for the 347 HealthiER participants, we use propensity score matching, which allows us to consider intervention and comparison group members to be equally likely to be part of the intervention group (as if randomly assigned), despite differences in demographic, health, and other measurable characteristics or covariates.

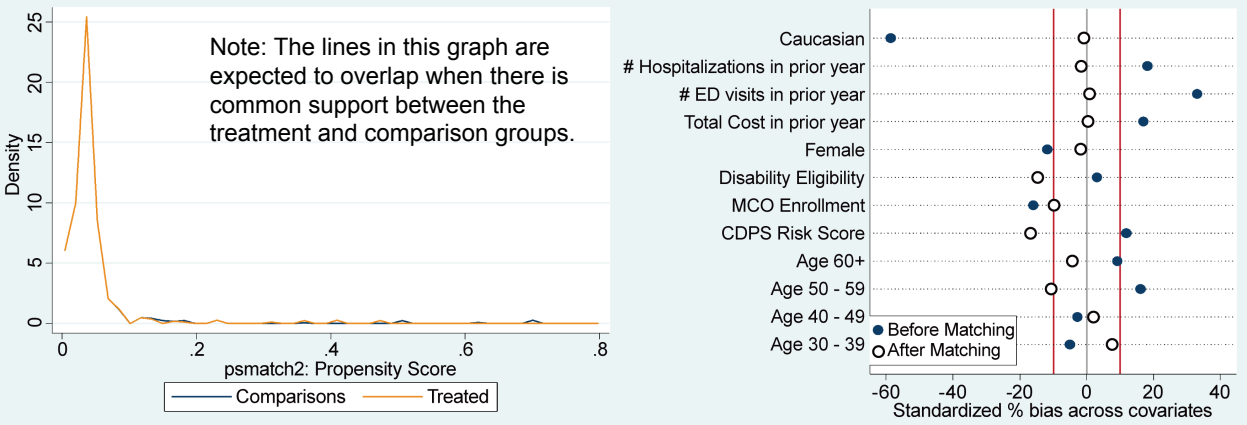
[128] January 2011 through December 2013.

Statistical techniques adjust for known sources of bias inherent to observational studies (e.g., differences in the covariates). Logistic regression is used to estimate a propensity score, or likelihood of being in the intervention group, given the measured characteristics (covariates) for each member of the intervention and comparison groups. Final propensity score models included age, race, gender, disability eligibility, number of ED visits in the prior year, and Chronic Illness and Disability Payment System (CDPS) risk score. See Appendix C for more details about comparison group selection and propensity score matching.

Exhibit UEMS.3 presents common support and balance in covariates across treatment and comparison groups.

- After matching, we observe nearly identical overlap in the density curves for propensity score in the treatment (shown in red) and comparison (shown in blue) groups, indicating equivalent propensity scores in the two groups.
- In the matched sample, we are able to attain balance in measures of gender, race, managed care enrollment, number of hospitalizations in the prior year, number of ED visits in the prior year and total cost of care in the prior year. We also obtain balance in most age categories. We did not obtain balance in disability eligibility and CDPS risk score and thus adjust DID results for age category, disability eligibility, and CDPS score.

Exhibit UEMS.3: Test of Common Support and Covariate Balance



Analysis

Model. We model dichotomous outcomes of inpatient admission and ED visits using population-averaged logistic regression models. Total cost of care is modeled as a continuous variable using GLM with a gamma distribution and log link. The enrollment date for the treatment population was their enrollment date into the HealthiER program; for the comparison group, the date of enrollment was set as the date of their ED visit in 2012, with the requirement that they had to have had at least two other ED visits in the previous 12 months. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Results

Descriptive Characteristics. Exhibit UEMS.4 displays the descriptive characteristics of Medicaid beneficiaries participating in HealthiER and those in the comparison group. We compare 347 HealthiER participants to a group of equal size occurring in the post-intervention period with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) and a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition).

HealthiER participants and the comparison group are similar in age, race, gender, managed care plan enrollment, and prior number of hospitalizations, ED visits, and prior total cost of care. Comparators are slightly more likely to be Hispanic and living with a disability than are HealthiER participants.

Exhibit UEMS.4: Descriptive Characteristics for the HealthiER Participants and Comparison Group Members

Variable	UEMS	
	Treatment	Comparison
Number of Beneficiaries	**347**	**347**
Age % (N)		
18-29 years	33.7 (117)	32.9 (114)
30-39 years	20.5 (71)	17.3 (60)
40-49 years	19.9 (69)	19.0 (66)
50-59 years	20.5 (71)	24.5 (85)
≥60 years	5.5 (19)	6.3 (22)
Race/Ethnicity % (N)		
White	21.0 (73)	21.3 (74)
Hispanic***	2.6 (9)	13.5 (47)
Gender % (N)		
Female	61.4 (213)	62.3 (216)
Medicaid Plan % (N)		
Enrolled in a Managed Care plan	82.1 (285)	85.3 (296)
Disability Status % (N)		
Disability*	30.0 (104)	36.6 (127)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Hospitalization per 1,000 (SD)	885 (2,800)	916 (1,817)
ED Visits per 1,000 (SD)	6,233 (10,942)	6,153 (10,948)
Total Medicaid Cost (SD)	$11,141 ($17,473)	$11,011 ($16,306)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. Results presented in Exhibit UEMS.5 represent the difference in average outcome between the UEMS intervention group and the comparison group *after* implementation of the intervention, minus

the difference in average outcome between the intervention and comparison groups *before* implementation of the intervention. This summative DID model assesses the impact of UEMS' HealthiER program across the entire post-implementation period.[129]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: During the first four quarters of the intervention, the HealthiER program is associated with a statistically significant reduction in ED visits (207 per 1,000 beneficiaries) and a non-significant decrease in hospitalizations (33 per 1,000 beneficiaries). In the small intervention sample (347 beneficiaries), these changes in utilization correspond to 72 fewer beneficiaries with an ED visit and 11 fewer beneficiaries with a hospitalization.
- Cost: During the first four quarters of participant follow-up, the HealthiER program was associated with a significant reduction in total cost of care of $1,072 per participant per quarter.
- Quality of Care Measures: We observe non-significant increases in the number of beneficiaries who receive a practitioner follow up visit (PV) within 7, 30 and 90 days after ED discharge of 2, 55, and 6 per 1,000 beneficiaries, respectively. For the small intervention sample, this change in utilization reflects 0.7, 19 and 2 additional beneficiaries with a practitioner visit within 7, 30, and 90 days, respectively, during the first four quarters of the intervention.

Exhibit UEMS.5: Difference-in-Differences Estimates for the HealthiER Program[130]

Variable	DID Estimate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	-33 [-70, 3]
ED Visits (Likelihood per 1,000 Beneficiaries)	**-207 [-261,-152]***
Total Quarterly Cost of Care per Beneficiary ($)	**-$1,072 [-$1,555, -$589]***
7-Day PV Follow-up (per 1,000 Beneficiaries)	2 [-60, 64]
30-Day PV Follow-up (per 1,000 Beneficiaries)	55 [-11, 120]
90-Day PV Follow-up (per 1,000 Beneficiaries)	6 [-56, 67]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. Key limitations of this analysis are that 1) only four quarters of follow up are currently available in New York Alpha-MAX claims, and 2) analysis only includes 25 percent of the participants enrolled in the HealthiER program because of alignment issues between HealthiER program enrollment and Alpha-MAX availability. In future reports, we anticipate that another one or two quarters of Alpha-MAX data will be available, and we plan to incorporate this data to increase the follow up time and to include additional HealthiER enrollees. If feasible, we will also consider sub-group analyses stratified by age or other meaningful population characteristics.

[129] Adjustment factors include target condition, age, gender, race/ethnicity, extent of FFS coverage, original coverage reason, prior year utilization, and HCC score.

[130] It is important to note that in this report, follow-up time was censored for UEMS participants at the earliest occurrence of death, disenrollment/completion of UEMS program or December 31, 2013 (latest claims available). To evaluate the effectiveness of the UEMS program over a longer period of time, we will not censor at disenrollment/completion of UEMS program in subsequent reports to CMMI.

Summary

Claims-based Analysis. Our quantitative analysis of the UEMS program shows that, in its first four quarters, the HealthiER program is associated with a reduction in ED utilization and total cost of care for participants between the pre-intervention period and the post-intervention period, relative to changes seen in a similar group of adult Medicaid beneficiaries over the same period.

Sustaining and Scaling the HealthiER Program. The awardee plans to sustain a modified version of HealthiER at the original intervention site (Erie County Medical Center's emergency department and affiliated outpatient clinics), retaining a focus on recruitment from both the emergency department and partner primary care clinics and narrowing the staff role of community health workers from care management and patient engagement to patient navigation and linkage of participants to primary care. UEMS has received a 12 month, no-cost extension for its HCIA 1 funding, and ECMC is expected to continue subsidizing primary care provider involvement; the intervention to date is not expected to be sustainable financially on the basis of primary care provider support alone, and hospital-wide support, yet to be specified, is anticipated to be necessary, to keep CHWs at the clinics. A critical measure of the awardee's success in sustaining and scaling its intervention is that New York State's Delivery System Reform Incentive Payment (DSRIP) program (Millennium Collaborative Care) –part of an 1115 section Medicaid waiver –includes a provision to scale the modified HealthiER intervention to seven additional sites, in addition to supporting HealthiER at ECMC. The modified version is known as the Emergency Department Care Triage project, and the UEMS team had a major role in the design of the project.

References

"The Healthier Community Health Worker Model." 2: UEMS.

HCIA 11QR Quarterly Report for University Emergency Medical Services, for Reporting Quarter End Date 3/31/2015. Submitted by UEMS, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by UEMS, 2015.

Healthier Evaluation Overview. University of Colorado - Anschutz Medical Campus, 2013.

Memorandum: Healthier Patient Focus Groups. University of Colorado - Denver Evaluation Team, 2014.

"University of Colorado Denver Evaluation Team Memorandum: Healthier Patient Focus Groups." University of Colorado Denver (UC Denver), 2014.

UEMS. *Healthier Baseline Process Evaluation Report: Fall 2013*. 2013.

UEMS. *Healthier Evaluation Team: Initial Site Visit Report*. UC Denver, 2013.

UEMS. *Healthier Mid-Point Process Evaluation Report: Fall 2014*. 2014.

UEMS. *Healthier Patient Service Checklist*. 2014.

UEMS. *Build Community Alliances to Strengthen Community Health Worker Programs,* 2015.

UEMS. *Community Health Workers for Frequent Emergency Department Utilizers*. 2015..

University of Arkansas for Medical Sciences

This chapter updates NORC's evaluation of the "Cost Effective Delivery of Enhanced Home Caregiver Training" initiative, sponsored by the Schmieding Center for Senior Health and Education, which is located in Northwest Arkansas and affiliated with the University of Arkansas for Medical Science (UAMS). The initiative provides enhanced training for both family caregivers and other direct care workers in Arkansas, and through partners, in California, Hawaii, and Texas, to better manage the care of elderly adults in the home.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. The focus in this chapter is on results from NORC's survey of direct care workers who have completed the HCIA-funded training through the Schmieding Center or partner and of direct care workers in Arkansas who received training elsewhere.

Overview of Awardee

CMMI Category for Awardee:	Community College/Vocational Training
Funding Amount:	$3,615,818
Launch Date:	3/25/2013
State(s) Where Located:	Arkansas, California, Hawaii, Texas

Patients Targeted and Served

UAMS does not collect data or report on patients served by the trainees.

Update: Implementation Experience in Third Year of Award

Since NORC's first annual report (September 2014), the UAMS Schmieding Center has continued to offer a revised and expanded set of courses targeting direct care workers in four states (Arkansas, California, Hawaii, and Texas), moved to develop on-line versions of these courses for delivery both in Arkansas and nationally, and continued to seek ways to improve the targeting of outreach and recruitment of prospective students. While new Arkansas state requirements in April 214 for 40 hours of training for direct care workers has been seen as boosting enrollment, UAMS staff note that a lack of oversight and enforcement has muted the potential impact of the new requirements.

Communications and Health IT. The awardee does not collect, analyze, or share data on patients or clients who hire the graduates of its direct care workforce training program.

Patient and Caregiver Engagement. The series of courses offered to direct care workers in Arkansas, California, Hawaii, and Texas focus on improving caregivers' mastery of clinical skills, knowledge of specific health conditions and how to care for them, and their ability to encourage client participation in the management of their own health. The awardee offers a total of five courses to direct care (paid) workers in Arkansas, California, Hawaii, and Texas, though unpaid family caregivers may also complete the courses. The classes may be taken individually or as a series.

While aspects of patient engagement are included throughout the curriculum, a stronger focus on participant and caregiver engagement is embedded in the "Family Care Advocate" (FCA) course, including strategies to improve health literacy and the role of caregivers as part of the health care team. To achieve these objectives, UAMS includes topics in the FCA course such as, "Healthy Living at Home: Modifiable Behaviors," and lessons on "Promoting Independence" for several chronic health conditions like COPD, diabetes, and stroke. In addition to instruction on direct participant engagement, the FCA course encourages caregivers themselves to become more actively involved with their clients' health beyond improving tangible, direct caregiving skills. For example, caregivers develop their health literacy and critical thinking skills, as well as skills critical to communicating with family and the larger health care team. Examples of lessons germane to these objectives are "Communicating with Family" and "Health Literacy and Communicating with Healthcare Professionals," the latter of which includes discussions on documentation of client health and understanding medical terminology.

UAMS does not collect data on clients served by the direct care workers they train, and so it is difficult to gauge the effectiveness that training caregivers has on participant engagement.

While aspects of participant engagement and caregiver supports may be integrated in training required of direct care workers throughout Arkansas, courses such as the FCA, which places greater emphasis on these concepts, are not required. These state-level policies—and the health care marketplace—have possibly diminished the perceived value of the FCA course by direct care workers, and may also reflect how policy makers and health care organizations value training in such concepts as participant engagement and caregiver supports.

Fidelity, Adaptability, and Self-Monitoring. While the key components of the program model have been maintained over the three year course of HCIA funding (e.g., courses and micro-credit loans), UAMS has modified implementation across the partner sites in four states, in response to factors both external and internal to the intervention. The Hawaii site, based at a university, was reluctant to include the microcredit loan option, citing concern that the university would be fiscally liable for loans not paid back in full. The Texas site, based at a state agency, folded the HCIA-supported training into Certified Nursing Assistant coursework but saw the pricing as too low to be sustainable. At the California site, as with Texas, the focus has been on Certified Nursing and institutional care, in contrast to the Arkansas program's focus on training workers for home health. Greater uniformity of training is expected as the awardee's course are more fully developed and delivered on-line. Across the sites, UAMS has administered pre- and post-surveys to trainees, to monitor and report on student experiences and measure changes in knowledge, skills, behavior, and perceived employment prospects.

Program Effectiveness

For most of the awardees in NORC's CHRPT portfolio, our evaluation design uses quantitative assessment based on claims data to answer most questions about program effectiveness. Because UAMS does not collect information about the patients who employ (or are cared for informally) by graduates of their training program, NORC is unable to assess the UAMS program's effectiveness in this way. Our survey of trainee experience provides limited data on patient experiences, as reported by trainees, as well as more directly assessing the success of the training effort from the perspective of the trainee.

Survey of Workforce Trainee Experience

For evaluation of the UAMS workforce intervention, we surveyed direct care workers who had undergone the UAMS Schmieding Center training (the treatment group) and other caregivers in Arkansas who were trained elsewhere (the comparison group). Because the State of Arkansas instituted a new requirement in 2014 that home caregivers must complete 40 hours of training, all paid caregivers could be expected to have received some training and, for many caregivers, recent training. The survey addresses NORC's key evaluation domains of workforce training effectiveness and provides important information about the client populations served by UAMS trainees and the comparison group (the latter especially important, given the lack of claims data available for UAMS). A series of questions for trainees operationalize these research areas, including 1) characteristics of the caregiver training program (e.g., usefulness of materials), 2) objectives of the program (e.g., skills learned), 3) trainee experience (e.g., ease of fitting training into schedule), 4) financing of the program (e.g., funding source for trainee), 5) trainee satisfaction with the program, and 6) contextual factors influencing the workforce (e.g., support provided by employer, wage).

Survey Administration. NORC launched the UAMS survey in August 2014 and completed it in June 2015. Our original goal was to complete 500 interviews each with the population of UAMS-trained caregivers and with a sample of caregivers trained elsewhere and working in Arkansas (the comparison group). The awardee provided NORC with the names and contact information of 2,795 UAMS trainees through August 2014. This contact information was the basis of our sampling frame for the treatment group. The sampling frame for the comparison group was more challenging to acquire because we did not have a single source of contact information for caregivers trained by other (non-UAMS) programs.

After reaching out to home care, home health, and other agencies employing home caregivers in Arkansas, UAMS obtained and shared with NORC the contact information for approximately 400 caregivers employed at these agencies. NORC received this information from UAMS in October and December 2014. NORC supplemented UAMS's efforts to identify home caregivers who had been trained elsewhere by following up with agencies that had not responded to the initial outreach by UAMS. We received a small number of caregiver names in January 2015. In early February 2015, NORC conducted a conference call with UAMS and an agency that employs approximately 500 caregivers. Once caregivers provided their permission for their employer to share their contact information with NORC, the agency sent that information to us. We excluded any caregivers who had received training at UAMS by comparing the caregivers' names with those on the Schmieding trainee list and then included the remaining caregivers in the survey. This same agency also reached out to similar agencies around Arkansas to encourage their assistance with providing caregiver information for the NORC survey. Another large agency agreed to collaborate with NORC to recruit caregivers to participate in the survey. NORC generated unique PIN numbers for the agency's staff of 700 caregivers, and this second agency then mailed invitation letters with the PIN numbers to their staff; NORC had no record of the caregivers' contact information until they called a toll-free number to complete the survey. Because these agencies did not report the source of training for their caregiver staff, NORC was unable to determine prior to the telephone interview whether these caregivers had received their training from UAMS or from some other source. Ultimately, some caregivers from these agencies self-identified as UAMS trainees during the

survey. Our recruitment of potential respondents for a comparison group ended with these two agencies' employees, and survey administration ended in mid-June 2015.

We exceeded our goal for UAMS trainees with 727 completed telephone interviews (57 percent Response Rate)[131] and met half of our goal for the comparison sample with 249 completed interviews. Overall the survey response rate (66 percent), as well as the UAMS response rate, was calculated using eligible respondents with "good" or correct contact information who completed the entire survey (respondents with "bad" or incorrect contact information discovered during data collection were excluded from the count of eligible respondents, as were UAMS trainees without any contact information provided prior to data collection; n=267). Of the 727 UAMS-trained survey respondents, 62 percent had completed a course in the period after the award of HCIA funding in 2012.

Respondents recruited via PIN invitation appear to be somewhat different demographically than respondents in the original UAMS and comparison groups. These differences may be a consequence of the geographic location of the agency by which they were recruited on behalf of NORC, which was a different region of the state from the region where Schmieding provided most of its training.

Data Analysis. The analytic datasets were created by dividing the UAMS data files into two subset groups 1) UAMS trainees (those who reported "having completed any caregiver training courses at the Schmieding Center") and 2) caregivers in Arkansas who were trained elsewhere (comparison group). We include only completed interviews, defined as those with answers to all questions in the survey, in the analysis, and analyzed demographic information by sample type. We further divide these two samples by caregiver work status:

- Currently working as caregiver
- Unpaid family caregiver
- Completed caregiver training but not currently working as a caregiver nor an unpaid family caregiver.

These sub-groups allowed for a more direct comparison of the treatment and comparison groups on factors such as training assessments and satisfaction, skills learned, and patient characteristics, thus removing variation due to differences between respondents based on work status. We conducted quality control checks to identify missing, invalid, inconsistent or otherwise potentially inaccurate records, and reviewed open-ended responses to identify commonalities and themes. Response options of "Don't Know/Refused" were excluded from analysis due to low frequency, and substantial outliers that seemed unrealistic were removed to avoid data skew. For example, a reported age of 96 was excluded from analyses using age because this respondent also reported being an employed caregiver to clients other than family members; a report of 35 clients served per week by an unpaid family caregiver was also excluded.

[131] Response rate is limited to completed surveys by UAMS trainees only, defined as any caregiver identified by UAMS to have completed a training course or a respondent who self-identified as a UAMS trainee.

[2] Response rate is based on the number of completed surveys by caregivers identified by UAMS to have completed a training course *plus* the number of caregivers identified by agencies that cooperated in the UAMS survey.

Results

In the following section, we present overall results by treatment and comparison group, then begin to look more closely at the sub-groups within sample type based on work type. Where variation in response patterns points to a potential statistically significant difference between two groups, we perform chi square or t-tests and report the results.

Exhibit UAMS.1 presents demographic and other basic information for UAMS trainees and the comparison group. Respondents in both groups share several key demographic markers, including a similar age distribution, racial/ethnic composition, and a majority in both groups are women. The average number of clients served per week and hours per week spent with each client vary little between the two groups. On average, UAMS trainee and comparison group respondents serve two or three clients per week, spending roughly the same amount of hours per week with each client (21 to 24 hours per client). Key differences include:

- Trainees are slightly more educated than the comparison group, with 67 percent having at least some college education compared to 58 percent of comparison group respondents.
- Seventy-eight (78) percent of comparison group respondents view their work as a caregiver as a "long-term career" compared to two-thirds (67 percent) of UAMS trainees who view their work as a caregiver the same way.
- Respondents reporting they are "currently working as a caregiver" is higher among the comparison group (82 percent) than among UAMS trainees (61 percent).
- Of those who are currently employed as caregivers, the type of employment varies between and within groups. Given our different recruitment approaches for the treatment and comparison groups, which relied, for UAMS trainees, on the awardee's enrollment lists and, for caregivers trained elsewhere, on agencies' staff rosters, a majority of the comparison group (69 percent) reported working for a home health or home care agency. In contrast, only 30 percent of UAMS trainees reported working for an agency, and 19 percent as an independent contractor (compared to just 2 percent of the comparison group).
- On average, respondents in the comparison group report having worked with older adults longer than UAMS trainees (11 versus 8 years). While caregivers in the comparison group report more experience, UAMS graduates report more hours of training: on average, 88 hours of training compared to an average 67 hours for the comparison group.

Exhibit UAMS.1: Demographic Characteristics of UAMS Trainees and Comparison Group Survey Respondents

Variable	UAMS Trainees	Comparison
Number of Respondents	727	249
Gender % (N)		
Female	89.4 (650)	91.6 (228)
Age Group[1] % (N)		
Less than 30 years	15.7 (114)	15.3 (38)
30-54 years	32.1 (233)	39 (97)
55-64 years	25.5 (185)	24.1 (60)
65-74 years	17.2 (125)	17.7 (44)
≥75 years	4.4 (32)	2.8 (7)
Race[1] % (N)		
White	69.5 (505)	67.5 (168)
Black or African American	23.7 (172)	24.9 (62)
Asian	0.69 (5)	0.0 (0)
Native Hawaiian or Other Pacific Islander	0.14 (1)	0.80 (2)
American Indian or Alaska Native	0.83 (6)	3.2 (8)
Other	4.26 (31)	3.2 (8)
Hispanic, Latino/a, or Spanish origin[1] % (N)		
Yes	5.2 (38)	3.2 (8)
Highest Level of Education[1] % (N)		
Less Than High School	3.7 (27)	6.8 (17)
High School or GED	29.2 (212)	34.9 (87)
Some College or Less Than 4-Year Degree	42.2 (307)	45 (112)
College Graduate or 4-Year Degree	17.2 (125)	7.6 (19)
Post-Graduate Work or Advanced Degree	7.57 (55)	5.2 (13)
Currently Working as a Caregiver[1] % (N)		
Yes	61.2 (445)	81.9 (204)
No, Unpaid family caregiver	15.1 (110)	10.8 (27)
No, Completed/In Process of Completing Caregiver Training	23.7 (172)	7.2 (18)
Type of Employment, Among Those Working as a Caregiver[1] % (N)		
Home Care or Home Health Agency	30.4 (221)	69.1 (204)
Independent Contractor	19 (138)	1.6 (4)
Both Agency and Independent Contractor	9.9 (72)	9.2 (23)
View Work as Short-Term Job or Long-Term Career[1] % (N)		
Short-Term Job	28.3 (206)	20.1 (50)
Long-Term Career	66.6 (484)	77.5 (193)
Don't Know	4.7 (34)	2.4 (6)
Other Characteristics[2] % (N)		
Years Working with Older Adults	8.4 (719)	11.4 (248)
Number of Clients Served Per Week	2.3 (537)	3.1 (225)
Hours Per Week Spent with Each Client	24.1 (519)	21.1 (220)
Hours of caregiver training	88 (556)	67.4 (178)

NOTES: [1]Responses of "Don't Know/Refused" have been excluded from table due to small numbers; frequencies for any give variable may not sum to 100%. [2]Responses of "Don't Know/Refused" have been excluded from the mean.

Exhibit UAMS.2 shows the number of UAMS trainee respondents who have completed each of the six courses offered by UAMS. At least three-quarters of trainees have enrolled in most courses, ranging from 74 to 80 percent, with the exception of In-Home Assistant (64 percent) and Family Care Advocate (FCA) (37 percent), both of which are more recent and developed with HCIA funding. Notably, the In-Home

Assistant course may be used to satisfy Arkansas State training requirements for home caregivers while the FCA course is not required by the state or home care/home health agencies and does not typically affect trainee income. This may explain the higher enrollment rate for the In-Home Assistant course as compared with the FCA course.

Exhibit UAMS.2: UAMS Courses Completed

Variable	Value
UAMS Course Name % (N)	**Completion**
Elder Pal	77.7 (565)
Personal Care Assistant	80.1 (582)
Home Care Assistant	74.6 (542)
Alzheimer's and Dementia	74.1 (539)
Family Care Advocate*	36.6 (266)
In-Home Assistant*	63.8 (464)

*Developed with HCIA Funds.

Work Status: Currently Working as Caregiver

Exhibit UAMS.3 shows UAMS trainee and comparison respondents' satisfaction with their caregiving training. Results represent the caregiver sub-group comprised of those who are currently working as a caregiver (445 UAMS trainees and 204 comparison). Most UAMS trainees (91 percent) are very satisfied with their caregiver training. Although satisfaction among the comparison group respondents is high, the distribution between "very" and "somewhat" satisfied is slightly lower. Only a few respondents in each group report that they are somewhat or very dissatisfied with their training.

Exhibit UAMS.3: Satisfaction with Training, UAMS Trainees and Comparison Group

Variable	UAMS Trainees	Comparison
Satisfaction with Training as a Caregiver[1] % (N)		
Very Satisfied	90.8 (404)*	78.4 (160)*
Somewhat Satisfied	8.1 (36)	18.1 (37)
Neither Satisfied nor Dissatisfied	0.0 (0)	1.5 (3)
Somewhat Dissatisfied	0.45 (2)	0.49 (1)
Very Dissatisfied	0.22 (1)	0.98 (2)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; frequencies for any given variable may not sum to 100%.
*Differences in responses of "Very Satisfied" are statistically significant between UAMS and comparison groups at p<.05.

Exhibit UAMS.4 displays caregivers' assessments of their training program. Results are limited to the sub-group of those who are currently working as caregivers. Views about the structure of their training vary little between UAMS trainees and the comparison group and are overwhelmingly positive. Both groups are nearly unanimous (99 percent) in reporting that training materials were useful and the vast majority (90 percent trainees and 93 percent comparison) think that instructors often allowed adequate time for questions and discussions. While a majority (84 percent trainees and 88 percent comparison) reported that the courses were very easy or somewhat easy to fit into their own schedules, slightly more trainees (12 percent) than comparators (6 percent) report some difficulty with scheduling their training.

Since a large portion of the comparison group was recruited from agencies that directly provide training to their employees, this difference could reflect a potential advantage to internal agency training.

Exhibit UAMS.4: Training Structure, UAMS Trainees and Comparison Group

Variable	UAMS Trainees	Comparison
Whether Training Materials Were Useful[1] % (N)		
Yes	99 (440)	99.5 (200)
How Often Adequate Time Given for Questions/Discussion[1] % (N)		
Often	90.3 (402)	92.5 (185)
Some of the Time	7.4 (33)	7.0 (14)
Hardly Ever/Rarely	1.8 (8)	0.5 (1)
Never	0.45 (2)	0.0 (0)
Ease of Fitting Training into Schedule[1] % (N)		
Very Easy	55.1 (245)	59.2 (119)
Somewhat Easy	29 (129)	28.9 (58)
Neither Easy Nor Difficult	3.6 (16)	6.5 (13)
Somewhat Difficult	9 (40)	5.5 (11)
Very Difficult	3.2 (14)	0.0 (0)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%.

Exhibit UAMS.5 shows the percentage of survey respondents who learned various skills from the UAMS series of courses or, in the case of the comparison group, other training programs. As previously noted, results represent those trainee and comparison respondents who are currently working as caregivers. Across caregiver sub-groups, the vast majority of respondents consistently report having learned each skill listed and feeling prepared to perform the job of a home caregiver. The difference between them, however, is greater for learning stress reduction techniques. A higher percentage of UAMS trainees (94 percent) report learning ways to reduce their stress compared to respondents in the comparison group (80 percent). Open-ended responses capturing respondent opinions of 'the most useful part training' show that while a majority of trainee and comparison respondents report learning caregiving techniques, the most useful aspects of training vary between caregiver sub-groups. Twenty percent of UAMS trainees report that training specific to cognitive impairments (including dementia and Alzheimer's) was most useful, compared to only 4 percent of comparison group respondents. A majority of trainees have taken the UAMS Alzheimer's and Dementia training course (Exhibit UAMS.2) and a comparable course may not have been available in other training programs, which could account for some of this variance. Comparison group respondents, however, report general course information being most useful (42 percent) at a higher rate than do their UAMS trained counterparts (31 percent). One training feature frequently cited by both groups as most useful was the "hands-on" or experiential training component (17 percent of UAMS trainees and 20 percent of comparators).

Exhibit UAMS.5: Skills Learned, UAMS Trainees and Comparison Group

Variable	UAMS Trainees	Comparison
Training Experience	**% Responded Yes (N)**	
Learned Skills to Communicate with Client's Health Care Team	97 (428)	93 (187)
Learned Documentation Skills Helpful to Health Care Team	98 (435)	95 (191)
Learned to Monitor Changes in Client's Health	98.4 (436)	97.5 (197)
Learned How to Talk with Clients About Their Health Goals	95.4 (418)	90.6 (182)
Learned How to Provide Care the Way Clients Prefer	99 (437)	98 (199)
Learned Techniques for Reducing Stress	93.6 (410)*	80.3 (159)*
Feel Prepared to Perform Job of Home Caregiver	99.3 (441)	99 (200)
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	92.8 (413)	90.7 (185)

NOTE: *Difference is statistically significant between UAMS and comparison groups at p<.05.

Exhibit UAMS.6 displays caregivers' assessments of their main client's health and whether they are a primary caregiver for a friend or family member in their household. Results are for those trainees who are currently working as caregiver. Overall, a majority of UAMS trainee and comparison group respondents report that their main client has cognitive impairments (difficulty remembering or making decisions) and difficulty with mobility and dressing/bathing. The most variance between the two groups is found in the number of respondents reporting that a main client has cognitive impairments. Sixty-six (66) percent of UAMS trainees report a client with difficulty concentrating, remembering, or making decisions compared to 56 percent of respondents in the comparison group. This difference is further supported in respondents' open-ended responses identifying the main reason their client needs help. Twenty-two (22) percent of UAMS trainees note that dementia is the main reason their client needs assistance, compared with 13 percent of comparison group respondents. Reports of needing assistance with activities of daily living (ADLs) and mobility challenges as main reasons for client help were similar across UAMS and comparison group respondents, with 26 percent of both groups reporting providing ADL assistance and 26 percent of UAMS and 24 percent of comparison group respondents noting client mobility challenges.

UAMS trainees and comparison group respondents are evenly distributed in caring for a family member or friend in their household, who might or might not be their main client. Just under 25 percent of each group is the primary caregiver for someone in their household, in essence pulling "double-duty" as a caregiver in the workforce and in the family. And among those who are the primary caregiver for a family member or friend in their household, half of the respondents, for both the trainee and comparison groups, report this person being their main client.

Exhibit UAMS.6: Patient Health and Family Caregiving, UAMS Trainees and Comparison Group

Variable[1]	UAMS Trainees	Comparison
	% Responded Yes (N)	
Main Client has Serious Difficulty Walking or Climbing Stairs	79.8 (355)	80.9 (165)
Main Client has Difficulty Dressing or Bathing	75.7 (337)	81.4 (166)
Main Client has Serious Difficulty Concentrating, Remembering, or Making Decisions	65.6 (292)	56.4 (115)
Primary Caregiver for a Family Member or Friend in Household	22.9 (102)	24 (49)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%.

Exhibit UAMS.7 shows the percentage of UAMS caregivers who report being given different types of feedback from the home health or home care agency that employs them. The extent to which agencies are able to provide constructive feedback may facilitate or inhibit caregivers' ability to use skills learned in training, and thus influence the impact of such training. Results represent those caregivers currently working as a caregiver and are further limited to those reporting employment at a home care or home health agency. Employed caregivers in the treatment and comparison groups report receiving constructive criticism and helpful hints to about the same extent, with a majority reporting they receive this type of feedback. Slightly more UAMS trainees report getting feedback on things they do well (73 percent) and problem-solving advice (77 percent) than comparison group respondents (67 percent and 73 percent, respectively).

Exhibit UAMS.7: Workforce Experience, UAMS Trainees and Comparison Group

Variable[1]	UAMS Trainees	Comparison
	% Responded Yes (N)	
Given Specific Feedback about Things You Do Well	73 (214)	66.7 (130)
Given Specific Comments about Things You Could Improve	63.1 (185)	61 (119)
Given Helpful Hints	79.9 (234)	79 (154)
Given Problem-Solving Advice	77.1 (226)	72.8 (142)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%.

Work Status: Unpaid Family Caregiver (UAMS Trainees)

The students that UAMS enrolls are largely comprised of paid caregivers, though unpaid family caregivers also enroll in UAMS courses to expand their knowledge and skill set as they care for a family member or friend. Exhibit UAMS.8 reflects the training experiences of unpaid family caregivers (115 UAMS trainee respondents), which may vary from the paid caregiver workforce (also shown). While most (88 percent to 94 percent) unpaid family caregivers report learning various caregiving skills, fewer report learning these skills than do currently employed caregivers. Unpaid family caregivers also feel less prepared to perform the job of a home caregiver, which might be an indication of an extra burden felt by family caregivers, who may perceive that their responsibility is greater or more encompassing for those they care for, than do paid caregivers.

Exhibit UAMS.8: Training Experience/Satisfaction, UAMS Unpaid Family Caregivers

Variable	UAMS Trainees	
	Unpaid Family Caregivers	Employed Caregivers
Training Experience	**% Responded Yes (N)**	
Learned Skills to Communicate with Client's Health Care Team	91.3 (105)	97 (428)
Learned Documentation Skills Helpful to Health Care Team	89.6 (103)*	98 (435)*
Learned to Monitor Changes in Client's Health	91.3 (105)*	98.4 (436)*
Learned How to Talk with Clients About Their Health Goals	88.7 (102)	95.4 (418)
Learned How to Provide Care the Way Clients Prefer	93.9 (108)	99 (437)
Learned Techniques for Reducing Stress	88.7 (102)	93.6 (410)
Feel Prepared to Perform Job of Home Caregiver	93 (107)*	99.3 (441)*
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	78.3 (95)*	92.8 (413)*
Satisfaction with Training as a Caregiver[1]	**% Responded Yes (N)**	
Very Satisfied	84.4 (97)*	90.8 (404)*
Somewhat Satisfied	14.8 (17)	8.1 (36)
Neither Satisfied nor Dissatisfied	0.0 (0)	0.0 (0)
Somewhat Dissatisfied	0.87 (1)	0.45 (2)
Very Dissatisfied	0.0 (0)	0.22 (1)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%. *Difference is statistically significant between UAMS unpaid family caregivers and UAMS employed caregivers at p<.05.

Exhibit UAMS.9 displays the health profile (as reported by caregivers) of patients cared for by unpaid family caregivers (115) and currently employed caregivers (445) trained by UAMS, as well as the percentage of unpaid family caregivers living with a care recipient. When compared with patient profiles from paid caregivers, unpaid family caregivers are caring for significantly fewer patients with serious functional difficulties with activities like walking/climbing the stairs and dressing/bathing. Open-ended responses capturing the client's main need, as reported by the respondent, show a higher rate of mobility issues (26 percent paid caregivers, 19 percent unpaid family caregivers), dementia (22 percent paid caregivers, 17 percent unpaid family caregivers) and assistance with activities of daily living (26 percent paid caregivers, 10 percent unpaid family caregivers) among the clients of paid caregivers. This pattern may be due to under-reporting on the behalf of the unpaid family caregivers, who may be reluctant or unable to recognize serious functional issues, given their close relationship to the care recipient. Unpaid family caregivers may also be taking courses proactively, that is, before a family member or friend experiences greater functional decline.

Exhibit UAMS.9: Patient Health Reported by UAMS-trained Family Caregivers

Variable[1]	UAMS Trainees	
	Unpaid Family Caregivers	Employed Caregivers
	% (N)	
Main Client has Serious Difficulty Walking or Climbing Stairs	60.9 (70)*	79.8 (355)*
Main Client has Difficulty Dressing or Bathing	56.5 (65)*	75.7 (337)*
Main Client has Serious Difficulty Concentrating, Remembering, or Making Decisions	59.1 (68)	65.6 (292)
Primary Caregiver for a Family Member or Friend in Household	69.6 (80)	22.9 (102)
Family Member or Friend in Household is Main Client[2]	75 (60)	58.8 (60)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%. [2] Percent based on number respondents that reported being a primary caregiver for a family member or friend in their household.
*Difference is statistically significant between Unpaid Family Caregivers and Employed Caregivers at p<.05.

Work Status: Completed caregiver training but not currently working as a caregiver or as an unpaid family caregiver

Our survey also includes UAMS trainees who had completed some training but were not currently employed as a caregiver or an unpaid family caregiver (167 UAMS trainee respondents). When asked why they were not currently employed or taking care of a family member or friend, most who provided a response indicated that they were still a student or a recent graduate (20 percent), unable to find employment (18 percent), or had health or other family circumstances that prohibited their caregiving work (18 percent). Exhibit UAMS.10 shows the percentage of respondents in this group who learned various skills from the UAMS series of courses and reported various levels of satisfaction with the training program. Similar to results from unpaid family caregivers, *fewer* respondents in this group of trainees report having learned various skills or feeling prepared to become a caregiver, compared with currently employed UAMS trainees. It may be that unless a caregiver has the opportunity to use the skills they have learned (whether in the workforce or for family members/friends), they do not have a yardstick by which to measure the skills they *should* have learned.

Exhibit UAMS.10: Training Experience/Satisfaction, Other UAMS Trainees

Variable	UAMS Trainees
Training Experience	**% Responded Yes (N)**
Learned Skills to Communicate with Client's Health Care Team	93.4 (156)
Learned Documentation Skills Helpful to Health Care Team	92.8 (155)
Learned to Monitor Changes in Client's Health	96.4 (161)
Learned How to Talk with Clients About Their Health Goals	87.4 (146)
Learned How to Provide Care the Way Clients Prefer	94 (157)
Learned Techniques for Reducing Stress	87.4 (146)
Feel Prepared to Perform Job of Home Caregiver	95.8 (160)
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	94 (157)
Satisfaction with Training as a Caregiver[1]	**% Responded Yes (N)**
Very Satisfied	88 (147)
Somewhat Satisfied	9 (15)
Neither Satisfied nor Dissatisfied	1.8 (3)
Somewhat Dissatisfied	0.60 (1)
Very Dissatisfied	0.60 (1)

NOTES: [1]Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any given variable may not sum to 100%.

UAMS Micro-credit Loan

UAMS trainees financed their training in a variety of ways, with a slight plurality (43 percent) paying for their coursework out of pocket and another 41 percent paying for their training by some other means, such as scholarships, grants, or family members (these responses were captured in the open-ended "other, specify" field). UAMS also offered a micro-credit loan to students, funded by HCIA, as a way of financing the cost of UAMS courses. As of the awardee's Q11 report, 158 micro-credit loans had been distributed to students in Arkansas as part of the intervention. Forty-one UAMS students (5.6 percent) who accepted a micro-credit loan participated in the NORC survey. Three-fifths of these students indicated that they would be able to re-pay the loan in less than one year of disbursement. Among students who completed a course after 2012, when the micro-credit loan was implemented, but *did not* use a micro-credit loan (n=105), the most commonly cited reasons for declining the loan were 1) the trainee "did not need it" (42 percent), 2) it was not offered to the trainee or he/she was unaware of it (31 percent), and 3) the trainee did not want to pay interest/have a debt (11 percent). A small subset of respondents reported that they declined the loan for a more altruistic reason: they felt that someone in greater need should use the loan, an attitude that UAMS had hoped to inspire with the "pay it forward" concept of the micro-credit loan. These responses were elicited as part of an open-ended question, "What was the most important reason you did not use the micro-credit loan offered by the Schmieding Center?"

Exhibit UAMS.11: UAMS Micro-credit Loan

Variable	% (N)
How did you pay for your training?	
I paid for it	43.1 (313)
My employer or agency paid for it	9.5 (69)
Micro-credit loan through Schmieding Center	5.6 (41)
Other (scholarships, grants, family members, etc.)	41.3 (300)
Don't Know	0.6 (4)
How long do you think it will take to pay back the loan? (Among respondents who used the micro-credit loan)	
Less than 1 Year	59.0 (23)
1-2 Years	25.6 (10)
More than 2 Years	2.6 (1)
Don't Know	12.8 (5)

NOTE: Two respondents who indicated that they used the micro-credit loan, in the "other specify" field, were not asked the follow-up question about length of time to pay back the loan, due to questionnaire skip logic.

Exhibit UAMS.12 shows the percentage of trainees who completed the Family Care Advocate (FCA) course and reported skills learned, compared with UAMS trainees who did not enroll in the FCA course. The FCA course was developed with HCIA funds. Skills may be acquired in multiple courses, and examining a specific UAMS course may show skills learned at a higher rate in one course over others. The results represent trainees who are currently working as a caregiver, with 262 trainees who did not enroll in the FCA course and 183 trainees who completed the FCA course. Respondents who completed the FCA course reported learning skills at or above the percentage of UAMS trainees who did not complete the course. FCA trainees were significantly more likely to report learning how to talk with clients about their health goals, compared to trainees who did not take the FCA course (99.5 v. 90.1). A significantly greater percentage of FCA trainees also reported talking with clients about setting up their

homes safely. Finally, more FCA trainee respondents learned techniques to reduce their own stress than their non-FCA counterparts.

Exhibit UAMS.12: Family Care Advocate Course Training Experience

Variable	Non-FCA	FCA
Training Experience	**% Responded Yes (N)**	
Learned Skills to Communicate with Client's Health Care Team	95.4 (250)	97.2 (178)
Learned Documentation Skills Helpful to Health Care Team	97.3 (255)	98.4 (180)
Learned to Monitor Changes in Client's Health	98.1 (257)	97.8 (179)
Learned How to Talk with Clients About Their Health Goals	90.1 (236)*	99.5 (182)*
Learned How to Provide Care the Way Clients Prefer	97.7 (256)	98.9 (181)
Learned Techniques for Reducing Stress	90.1 (236)	95.1 (174)
Feel Prepared to Perform Job of Home Caregiver	98.4 (258)	100 (183)
Talked with Clients about How to Set Up Their Homes so They Can Move Around Safely	90.1 (236)*	96.7 (177)*

NOTE: *Difference is statistically significant between FCA trainees and non-FCA trainees at p<.05.

Exhibit UAMS.13 also shows the percentage of FCA trainees who report being given different types of feedback from the home health or home care agency for whom they are employed, compared to their non-FCA trainee counterparts. Results represent trainees who report that they were currently working as a caregiver and currently working for a home health or home care agency (161 non-FCA trainees, 132 FCA trainees). FCA trainees report receiving constructive feedback at higher rates than non-FCA trainees, specifically in getting feedback on things they do well (78 percent FCA, 69 percent non-FCA) and on things they could improve (68 percent FCA, 59 percent non-FCA).

Exhibit UAMS.13: Family Care Advocate Course Trainees, Workforce Experience

Variable	Non-FCA	FCA
	% Responded Yes (N)	
Given Specific Feedback about Things You Do Well	68.9 (111)	78 (103)
Given Specific Comments about Things You Could Improve	59 (95)	68.2 (90)
Given Helpful Hints	78.4 (126)	81.8 (108)
Given Problem-Solving Advice	75.8 (122)	78.8 (104)

Summary

Workforce Survey. In our review of the UAMS workforce survey data, we find that trainees report very positive feedback about the UAMS training overall with regard to satisfaction, the structure of the training, and skills learned. When compared with caregivers who have received training somewhere other than at UAMS/Schmieding Center, many more UAMS trainees report the highest level of satisfaction with their training. As discussed in earlier NORC reports, these quantitative findings support the positive feedback about training gleaned from focus group discussions conducted with UAMS trainees during NORC's March 2014 site visit. While more UAMS survey respondents report having learned certain caregiving skills than comparison group trainees, almost all respondents in both groups report that they feel prepared to perform the job of a caregiver. Since more of the comparison group than UAMS trainees

are currently employed as caregivers, it may be that experience on the job fills any gaps in formal education.

Sub-group analysis of the UAMS trainees reveal noteworthy differences that may also be influenced by workforce experience. Unpaid family caregivers who completed UAMS courses report less satisfaction with the training overall, and fewer report learning specific caregiving skills, than trainees currently employed as caregivers. A similar pattern was observed among UAMS trainees who are neither employed nor caring for a family member or friend, when compared with employed caregivers. Our survey was limited in that questions focused on skills *learned,* rather than skills *used.* Caregivers who are employed may have more opportunities to use a wider range of skills, provided they work with a variety of clients, which may reinforce *recall* of learning skills altogether. Practicing skills on the job may build confidence in these skills, and our results might be a reflection of confidence in caregiving skills.

Slightly more UAMS trainees who have completed the HCIA-funded and advanced-level FCA course report specific caregiving skills learned than trainees who have not completed the course. Many more FCA students, however, report positive experiences with their agency of employment. The FCA course focuses on chronic disease management, communication, and patient advocacy; with these additional skills, UAMS trainees who have completed the FCA course may have more flexibility in the agencies for which they work (and may selectively choose agencies that provide more support to their workforce) and may be able to use skills learned in training more frequently in a more supportive environment.

Sustaining and Scaling the Schmieding Center Program. The awardee plans to sustain the program in modified form, independently of its partners under the HCIA grant, in Texas, California, and Hawaii.

The pilot design envisioned the micro-credit loan money, once repaid, as a revolving fund from which to make subsequent loans to students. However, in the spring of 2015, CMS notified UAMS that the grant funds used to support the microcredit loans would have to be repaid and that repayment would be the sole focus of a 12 month no-cost extension granted to UAMS. The awardee is exploring other options to finance the loans and thereby sustain the training program, for example, through private funding managed by the UAMS Foundation or a credit union. Another strategy already being implemented is to offer a special designation –that of a preferred provider –to home health agencies that pay for the training for their employees; this is an incentive for direct care workers, who are in demand.

An on-line version of the Family Caregiver Advocate course has been developed and launched (June 2015), using Skype to deliver competency testing with a trainer. This approach enables access for students in remote locations.

There are no plans to scale the intervention.

References

"Alzheimer's Diease and Dementia Course Outline." 1-11: University of Arkansas Medical Sciences, 2014.

"Family Care Advocate Course Evaluation." University of Arkansas Medical Sciences, 2014.

"Family Care Advocate Course Outline." 1-6: University of Arkansas Medical Sciences, 2014.

HCIA 11QR Quarterly Repor for University of Arkansas for Medical Sciences, for Reporting Quarter End Date 3/31/2015. Submitted by UAMS, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/201. Submitted by UAMS, 2015.

"Home Care Assistant Course Outline." 1-16: University of Arkansas Medical Sciences, 2014.

"In Home Care Assistant/ Personal Care Assistant Course Outline." 1-10: University of Arkansas Medical Sciences, 2014.

"Promotional Materials." University of Arkansas Medical Sciences, 2014.

"Schmieding Home Caregiver Training Pre-Assessment." 1-5: University of Arkansas Medical Sciences, 2014.

University of Iowa

This chapter updates NORC's evaluation of the University of Iowa Hospitals and Clinics' (U Iowa) program. The program involves a partnership with 10 rural critical access hospitals (CAHs) in nine counties, to reduce post-discharge ED visits and hospital readmissions for adult patients. U Iowa's criteria for participation in the intervention is broad, including patients from nine counties in Iowa who have been admitted to U Iowa with any chronic health (or serious health) condition or psychological condition. Patients receive care from one of the four Transition Care Teams (TCTs), staffed by a nurse, a social worker, a pharmacist, and a physician located at U Iowa, as well as a rural care coordinator located at each of the 10 rural CAHs. The intervention is designed to track and provide appropriate follow-up care and services to patients for 30 days, including a follow-up home visit within 72 hours of hospital discharge, with some patients disenrolling from the intervention before or after this 30-day time period, depending on the patient's needs. Some patients are also re-enrolled in the intervention if they are re-hospitalized at UIHC. The program also reconnects the patient with their rural primary care practitioner (PCP) or, for patients without one, identifies a local PCP for post-hospital follow-up. Reconnecting patients to their local PCP or establishing a new connection to a local PCP is important for continuity of care and for preventing potentially unnecessary hospital readmissions or emergency room visits.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims based analysis of program effectiveness.

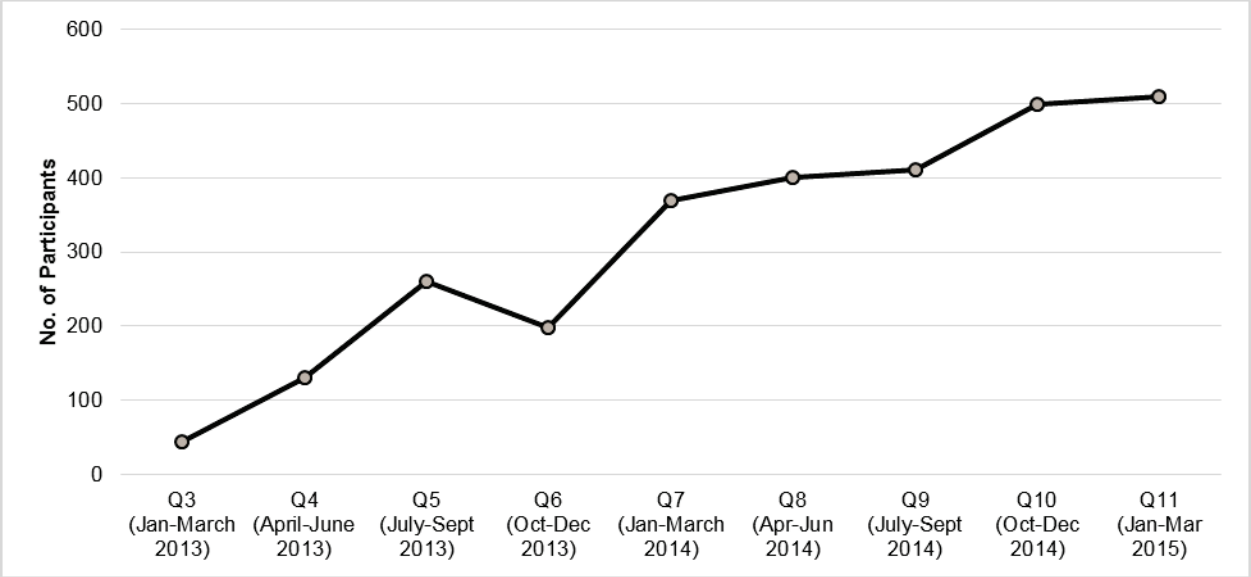
Overview of Awardee

CMMI Category for Awardee:	Academic/University
Funding Amount:	$7,662,278
Launch Date:	2/18/2013
State(s) Where Located:	Iowa

Patients Targeted and Served

Self-reported data from U Iowa provides enrollment data by HCIA reporting quarter, as shown in Exhibit UIHC.1. The data show a steady increase over time, except for a decline between Q5 and Q6. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 509 participants. As of March 31, 2015, the program had served a cumulative total of 1,942 unique participants since program launch, comprising 73 percent of the total number projected to be served over the three years of the HCIA-funded program (2,650 participants).

Exhibit UIHC.1: Total Number of U Iowa Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Half of patients are between the ages of 26 and 64 (50 percent), with the next largest group comprised of adults ages 65 and older (47 percent); a small proportion were young adults, ages 19 to 25 years (three percent).
- Gender: The gender split is about equal (48 percent female).
- Racial and Ethnic Identity: Almost all patients are identified as White (98 percent), with about one percent reported as Hispanic or Latino.

Update: Implementation Experience in Third Year of Award

Since NORC's site visit to UIHC (June 2014) and our first annual report (September 2014), U Iowa faced some challenges related to the use of "virtual" tele-handoffs and psychiatric services. During the spring of 2014 U Iowa began to use scheduled videoconferences to introduce patients to their rural care coordinator in their home community using handheld electronic tablets and videoconferencing software. U Iowa staff had planned to continue using tele-handoffs, in order to increase the percentage of patients willing to participate in home visits by the rural care coordinator following hospital discharge but experienced difficulties with this practice, due to a lack of WiFi in parts of the U Iowa hospital or at the Critical Access Hospital (CAH), and with scheduling the tele-handoffs when the U Iowa nurses and patients were all available. As a result, tele-handoffs did not continue as expected. U Iowa also faced challenges delivering psychiatric services to patients, both at U Iowa hospital and remotely to patients in rural counties using videoconference technology, not only due to the problems just mentioned, but also due to professional shortages and the lack of a sustainable financial model. There is a dearth of practicing psychiatrists in Iowa, including at U Iowa hospital, and reimbursement is typically not available for psychiatric services delivered by videoconference.

Communications and Health IT. In addition to daily team huddles and close collaboration among the U Iowa multidisciplinary team, UIHC uses several web-based applications to increase care coordination and the exchange of information between the UIHC-based TCT members and the rural care coordinators in the CAHs. The U Iowa team uses REDCap, a web-based application to manage and track program related data on patients enrolled in the intervention. The project team also use CareLink, a web-based applications used to access Epic EHR records, and since CareLink is only able to pull up the last patient record in Epic, the team implemented what they call "Hyperspace", another web-based application that allows users to access Epic EHR records from the last 90 days.

Patient and Caregiver Engagement. The U Iowa intervention engages patients on a variety of dimensions. All members of the U Iowa team, to some degree, contribute to patient engagement, but patient interactions with the U Iowa nurse care coordinator and the rural care coordinator are especially critical before and after hospital discharge. At U Iowa, during rounds patients are asked to be a part of the decision making process and are instructed on monitoring and managing their health conditions. Before discharge, patients also receive a one-page discharge summary to place on their refrigerator at home and this summary is discussed during the rural care coordinator's follow-up visit to the home. Before the patient is discharged, the program also reconnects the patient with their rural primary care provider (PCP) or, for patients without one, identifies a local PCP for post-hospital follow-up. After patients are discharged to home, the rural care coordinators conducts a home visit and provides additional patient education and instruction. During the home visit the rural care coordinators teaches self-management practices and connects patients to community resources when needed.

Fidelity, Adaptability and Self-Monitoring. While U Iowa implemented tele-handoffs mid-way through the program in an attempt to increase the percentage of patients willing to participate in post-discharge home visits by the rural care coordinator, this strategy did not turn out to be viable. The intervention faced deficits in the existing technology infrastructure, limited professional resources, and reimbursement policies that could not be overcome within the context of the innovation award. At the same time, U Iowa implemented their own patient satisfaction survey during the first half of 2015 as part of their self-evaluation, after U Iowa hospital's Hospital Consumer Assessment of Health Providers and Systems (HCAHPS) data proved untenable due to challenges separating out patients who received the intervention. The U Iowa team spent many months working with a multidisciplinary steering committee and other U Iowa providers, to develop and refine the survey items, in addition to developing the survey protocol. U Iowa also conducted interviews with patients in order to more fully understand patients' experience of the intervention, which will help the U Iowa team improve the transitional care experience.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results based on data for Medicare fee-for-service (FFS) beneficiary-episodes within the U Iowa program from July 1, 2013, through September 30, 2014. We use a comparison group of FFS Medicare beneficiaries discharged from the University of Iowa hospital and residing in comparison counties; the comparison group was developed in consultation with the

awardee.[132] We find that U Iowa's program reduces ED visits for its beneficiary-episodes post discharge, although this change is not statistically significant. No other measures of utilization or cost are lowered.

Measures. Findings are presented for six measures:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes
- 90-day total cost of care per beneficiary-episode
- 7-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes
- 30-day PV follow-up per 1,000 beneficiary-episodes

Research Question. For each measure, what is the difference in outcome between FFS Medicare beneficiary-episodes seen at U Iowa and those of the comparison group, after implementation of the U Iowa intervention, adjusting for differences in outcomes at baseline and risk factors across both populations?

Analytic Approach. We use a difference-in-differences (DID) analysis to compare changes in utilization and cost between FFS beneficiaries in U Iowa's intervention and those in the comparison group in the pre- and post-intervention implementation periods.[133]

Finder File and Creation of Analytic Sample. U Iowa provided a finder file with program participants and enrollment dates, as well as comparison group beneficiaries, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VDRC) to calculate outcome measures.[134] As shown in Exhibit UIHC.2, the finder file identified 3,677 unique treatment and comparison group beneficiary-episodes.[135] Beneficiary-episodes were matched for enrollment date, Medicare identifiers, admission date, eligibility definition for the intervention (FFS Medicare during month of program enrollment), and restricted to inpatient episodes (to better align with the comparison group), yielding an analytic sample of 2,517 episodes. Of these episodes, 990 beneficiary-episodes were attributed to the U Iowa intervention and 327 beneficiary-episodes were attributed to the comparison group during the post-intervention period.

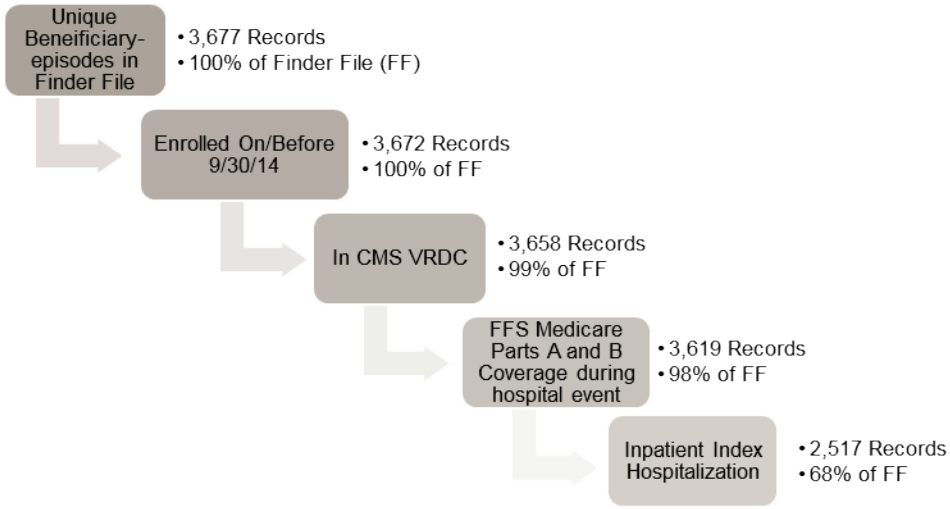
[132] The comparison counties had critical access hospitals with which UIHC did not partner and include the following Iowa counties: Buchanan, Fayette, Floyd, Mahaska, Lucas, Monroe, Davis, Iowa, Franklin, Grundy, Hardin, Jones, Delaware, Jackson, Mitchell, Appanoose, Clayton, and Howard.

[133] We exclude in our analyses observations during the ramp-up period of the intervention (January 1 through June 30, 2013).

[134] We use Medicare claims through December 31, 2014, for the analysis in this report. We include beneficiary-episodes discharged on or before September 30, 2014 in our analyses, to allow for a beneficiary-episode length of 90 days.

[135] We use beneficiary-episodes as our unit of analysis because the awardee program treats each beneficiary inpatient admission as an opportunity for quality improvement, and the finder file includes multiple admissions for some beneficiaries.

Exhibit UIHC.2: FFS Medicare Beneficiary-Episodes Identified Through UIHC Finder File



Comparison Group. Linking the finder file to Medicare claims, we identify treatment and comparison beneficiary-episodes discharged from U Iowa in the pre- and post-intervention periods. We present descriptive statistics comparing characteristics of beneficiary-episodes in these four groups (Exhibit UIHC.4). For more details on the methods used for this analysis, refer to Appendix C.

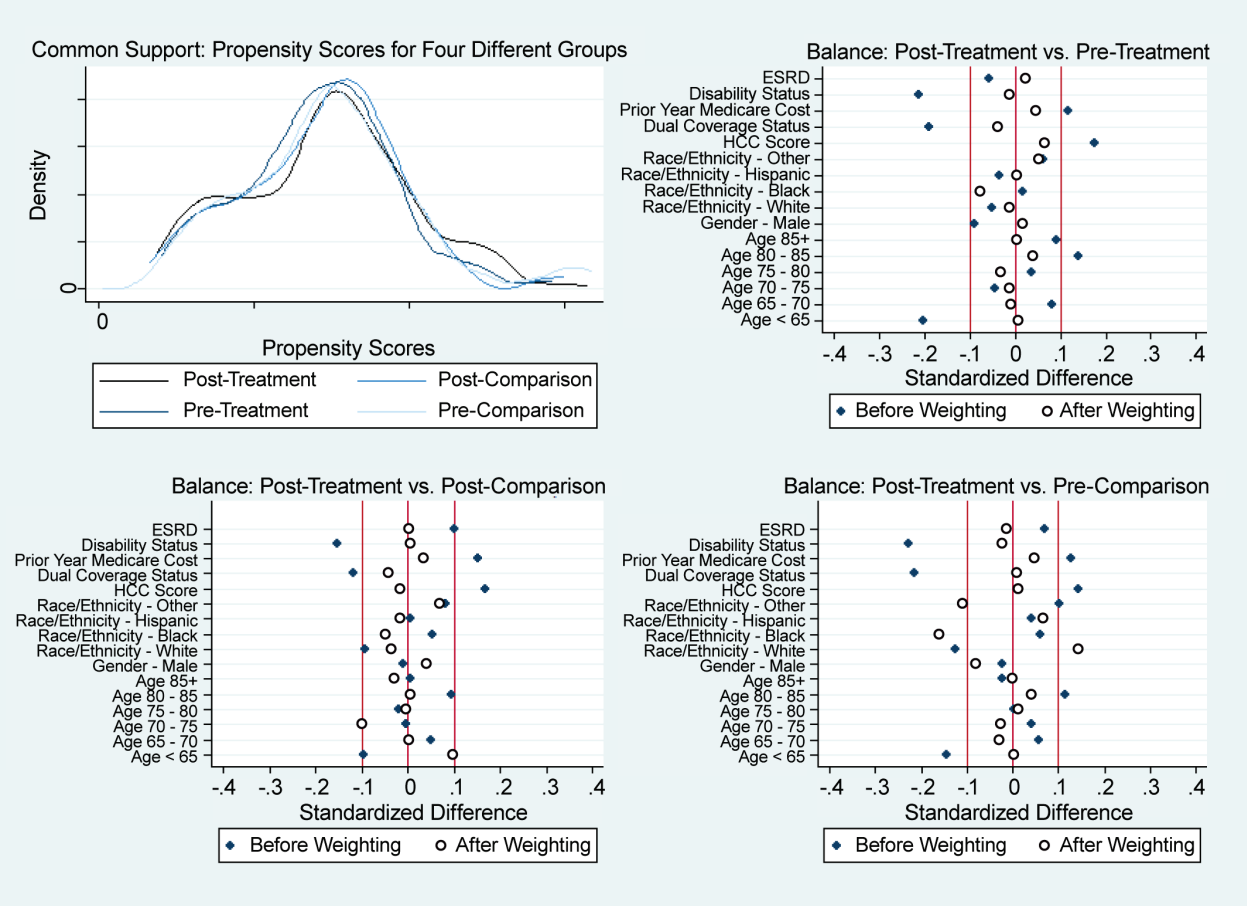
We use propensity score models to estimate the relative probability of a beneficiary-episode being in the UIHC post-treatment group, and calculate relative weights for beneficiary-episodes in the UIHC pre-treatment, pre-comparison, and post-comparison groups. For more details on comparison selection and weighting, see Appendix C. We incorporate these relative weights into our analysis to minimize observed differences in beneficiary-episode characteristics across four groups.

Exhibit UIHC.3 presents common support[136] and balance in covariates across U Iowa post-treatment, post-comparison, pre-treatment, and pre-comparison group patient-episodes.

- We observe a high level of overlap in distribution of estimated propensity scores across U Iowa post-treatment, post-comparison, pre-treatment, and pre-comparison group patient-episodes.
- The standardized difference between U Iowa post-treatment and one of three other (post-comparison, pre-treatment, and pre-comparison) group beneficiary-episodes across all covariates is negligible after incorporating relative weights, with the exception of differences in race/ethnicity between the post-treatment and pre-comparison group.

[136] Overlap in distribution of estimated propensity scores across U Iowa treatment and comparison group patient-episodes.

Exhibit UIHC.3: Test of Common Support and Covariate Balance



Analysis

Model. We compare the change in outcomes between treatment and comparison groups, across the entire post-intervention period (July 1, 2013, through September 30, 2014) and the pre-intervention period (July 1, 2011, through December 31, 2012), in a DID analysis. We use generalized linear models (GLM) with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a GLM with a log link and gamma distribution. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{ Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{ Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for trends over time (β_2).

Results

Descriptive Characteristics. Exhibit UIHC.4 presents descriptive statistics of beneficiary-episodes, comparing characteristics of discharges from U Iowa to treatment and comparison counties served by a CAH. For more details on the methods used for this analysis, refer to Appendix C. We compare discharges occurring in the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before the index hospitalization) or a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition).

Beneficiary-episode discharges from U Iowa to the intervention and comparison CAHs in the post-intervention period are similar with respect to their distribution of age, gender, and discharge disposition. Beneficiary-episodes from the intervention hospitals are more likely to have a greater number of comorbidities, a higher hierarchical condition category (HCC) score, and higher utilization and cost in the previous year. Finally, beneficiary-episodes discharged from UIHC to treatment CAHs are less likely to be eligible for Medicare by virtue of having a disability and slightly less likely to be White. In this report, we use propensity score weighing described earlier, to adjust for these observed differences in baseline covariates between the treatment and comparison groups.

Exhibit UIHC.4: Descriptive Characteristics for the U Iowa and Comparison Group Beneficiary-Episodes, Pre Implementation, Ramp-Up Period, and Post Implementation

Variable	Pre-Intervention		Ramp-Up Period		Post-Intervention	
	U Iowa	Comparison	U Iowa	Comparison	U Iowa	Comparison
No. of Beneficiary-Episodes	350	438	269	143	990	327
Age % (N)						
<65 years	43.7 (153)	37.4 (164)	38.3 (103)	32.9 (47)	30.0 (297)	32.1 (105)
65-69 years	14.3 (50)	15.8 (69)	13.4 (36)	11.2 (16)	16.6 (164)	17.1 (56)
70-74 years	19.1 (67)	12.6 (55)	16.7 (45)	16.1 (23)	16.0 (158)	15.6 (51)
75-79 years	9.1 (32)	11.2 (49)	9.7 (26)	12.6 (18)	11.0 (109)	12.8 (42)
80-84 years	8.0 (28)	10.0 (44)	13.8 (37)	9.1 (13)	14.8 (147)	11.0 (36)
≥ 85 years	5.7 (20)	13.0 (57)	8.2 (22)	18.2 (26)	11.6 (115)	11.3 (37)
Race/Ethnicity % (N)**						
White	96.3 (337)	98.9 (433)	94.4 (254)	98.6 (141)	94.9 (940)	98.2 (321)
Hispanic	0.9 (3)	0.0 (0)	0.4 (1)	0.0 (0)	0.3 (3)	0.3 (1)
Other	2.9 (10)	1.1 (5)	5.2 (14)	1.4 (2)	4.7 (47)	1.5 (5)
Gender % (N)						
Female	41.7 (146)	48.4 (212)	43.5 (117)	45.5 (65)	47.5 (470)	50.5 (165)
Hierarchical Condition Categories (HCC)						
Mean Count of HCCs (SD)**	4.9 (2.7)	5.0 (2.9)	4.7 (2.5)	5.1 (3.0)	5.3 (3.2)	4.9 (2.8)
Mean HCC Score (SD)**	3.0 (1.5)	3.1 (1.8)	2.9 (1.5)	3.2 (2.0)	3.3 (2.0)	3.0 (1.7)
Mean Utilization and Cost in Year Prior to Index Hospital Discharge						
Hospitaliz. per 1,000 (SD)**	1,774 (2,280)	1,958 (3,009)	1,930 (2,926)	1,613 (2,082)	2,060 (3,694)	1,531 (2,102)
ED Visits per 1,000 (SD)***	4,713 (19,021)	3,230 (4,658)	7,342 (24,320)	2,814 (3,746)	5,810 (19,149)	2,840 (3,899)
Total Medicare Cost (SD)***	$40,341 ($45,097)	$39,146 ($48,951)	$42,567 ($50,800)	$37,307 ($49,385)	$46,855 ($58,221)	$35,976 ($49,199)
Coverage Reason* % (N)**						
Age	44.0 (154)	45.2 (198)	49.8 (134)	53.1 (76)	58.7 (581)	53.8 (176)
Disability	45.4 (159)	50.9 (223)	42.4 (114)	41.3 (59)	34.2 (339)	44.3 (145)
ESRD	3.4 (12)	1.6 (7)	1.5 (4)	1.4 (2)	2.1 (21)	0.3 (1)
Disability and ESRD	7.1 (25)	2.3 (10)	6.3 (17)	4.2 (6)	4.9 (49)	1.5 (5)
Discharges % (N)						
Home	67.1 (235)	48.9 (214)	62.8 (169)	58.0 (83)	54.6 (541)	51.1 (167)
SNF	11.4 (40)	17.1 (75)	14.9 (40)	17.5 (25)	19.0 (188)	19.9 (65)
HHA	10.9 (38)	8.0 (35)	7.4 (20)	6.3 (9)	7.6 (75)	9.8 (32)
Hospice	0.6 (2)	2.7 (12)	0.4 (1)	2.8 (4)	2.9 (29)	3.7 (12)
Other	10.0 (35)	23.3 (102)	14.5 (39)	15.4 (22)	15.9 (157)	15.6 (51)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. Results in Exhibit UIHC.5 represent the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* implementation of the intervention. This summative DID model assesses the impact of the awardee's program across the entire post-implementation period.[137]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: U Iowa's program decreases 90-day ED visits (-29 per 1,000 episodes), but the decrease is not statistically significant. There is no decrease in 90-day hospitalizations or 30-day readmissions for U Iowa beneficiary-episodes, relative to the comparison group.
- Cost: U Iowa's program is associated with a non-significant increase in 90-day cost of care ($2,968 per episode), relative to the comparison group.
- Quality of Care Measures: U Iowa's program is associated with higher, but non-significant, 7-day practitioner follow-up visits (16 per 1,000 episodes), while 30-day practitioner follow-up visits decrease (-17 per 1,000 episodes) non-significantly after implementation of the program.

Exhibit UIHC.5: Difference-in-Differences Estimates for the UIHC Program

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	37 [-64, 138]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-29 [-133, 76]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	49 [-36, 135]
90-Day Total Cost of Care per Beneficiary-Episode ($)	$2,968 [-$3,123, $9,059]
7-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	16 [-82, 114]
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	-17 [-114, 79]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis is limited to five quarters of the awardee's eight-quarter implementation period. In future reports we will assess impacts for the U Iowa program, comparing beneficiaries discharged to counties with intervention CAHs to those discharged to comparison counties over its complete period of performance.

Summary

Claims-based Analysis. Our quantitative analysis of U Iowa's program shows non-significant decreases in 90-day ED visits for beneficiary-episodes, relative to the comparison group. The program does not show decreases in other measures of utilization or cost of care. Evidence for the program improving post-discharge primary care follow-up is mixed.

Sustaining and Scaling the U Iowa Program. During 2015, U Iowa readjusted their contracts with the CAHs in order to provide greater financial support to the CAHs that were experiencing higher volumes of

[137] Adjustment factors include age, race/ethnicity, gender, dual eligibility indicator, HCC score, prior year utilization, hospital episode length, discharge disposition, ESRD indicator, and disability indicator.

patients, since the volume of patients needing care from rural care coordinators varied substantially across counties. U Iowa reported that five out of the 10 partner CAHs plan to continue their involvement in the intervention, with rural care coordinators at these sites continuing to conduct post-discharge home visits and closely coordinate care with the U Iowa hospital. U Iowa reported in May 2015 that they are still working out which staff based at the U Iowa hospital will continue to be involved in the intervention, with nurses and pharmacists likely to maintain their roles in the program.

References

HCIA Supplemental Document for University of Iowa, for Reporting Quarter End Date 3/31/2013. Submitted by U Iowa, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by U Iowa, 2015.

HCIA 11QR Quarterly Report for University of Iowa, for Reporting Quarter End Date 3/31/2015. Submitted by U Iowa, 2015.

University of New Mexico

This chapter updates NORC's evaluation of the University of New Mexico's Project Extension for Community Healthcare Outcomes (ECHO) Care intervention. ECHO Care uses a "telementoring" care delivery model, which makes the consultative resources of university-based specialists available to multidisciplinary outpatient intensivist teams (OITs) to increase access, improve quality, and reduce inpatient stays and emergency department visits for high-risk adult Medicaid beneficiaries in New Mexico. With HCIA funding, Project ECHO's telementoring model for specialty consultation has been adapted in ECHO Care to focus on supporting OITs treating adults with multiple chronic health conditions and higher-than-average utilization within New Mexico's Medicaid managed care program. ECHO Care's goals are to improve disease management, access to specialty care, and reduce the costs of care for this medically complex population enrolled in one of the state's four Medicaid managed care organizations (MCOs).

ECHO Care operates in six pre-existing community clinics around the state. Each of the six sites hosts an interdisciplinary ECHO Care outpatient intensivist team (OIT) comprised of a nurse practitioner or physician assistant, a behavioral health counselor or social worker, nurses, community health workers (CHWs), a part-time physician, and part-time administrative staff. These teams are recruited locally and trained and supported by the central UNM ECHO Care staff. The OITs participate in biweekly didactic teleconferences on specific clinical topics and weekly multi-site videoconferences, where each team presents cases to the ECHO Care specialty consultants based at the UNM Medical Center in Albuquerque.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. This report summarizes results from two U New Mexico surveys, one of patient satisfaction with ECHO Care and the second of ECHO Care staff training and workplace experience.

Overview of Awardee

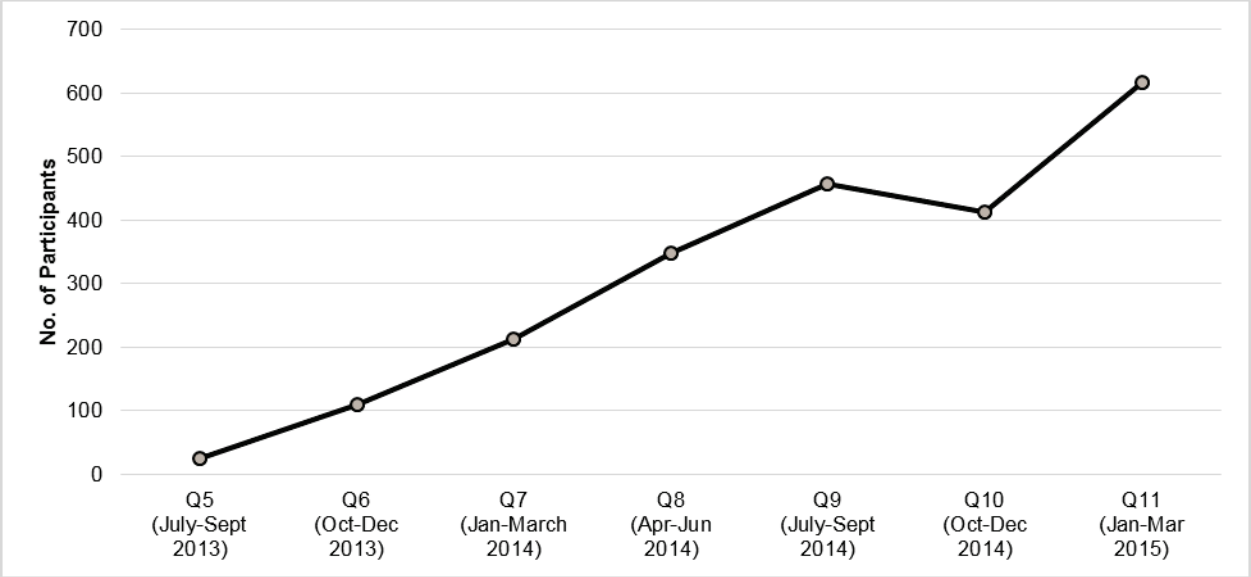
CMMI Category for Awardee:	Academic/University
Funding Amount:	$8,473,809
Launch Date:	9/1/2013
State(s) Where Located:	New Mexico

Patients Targeted and Served

Self-reported data from ECHO Care provides participant data by HCIA reporting quarter, as shown in Exhibit ECHO.1. The data show a steady increase in enrollment over time, except for a slight decrease between Q9 and Q10. Counts are for those considered to be indirect participants (receiving services from staff trained under the HCIA grant but whose services are not directly funded by the grant) rather than direct participants (those whose services are funded by the HCIA grant). During the most recent quarter for which data are available (January 1 through March 31, 2015), there were 617 total ECHO Care participants recruited into the intervention (including those both active and those who subsequently

disenrolled); a total of 471 participants were counted as active as of March 31, 2015.[138] The awardee has not reported the cumulative number of unique indirect participants served, so NORC is not able to determine how ECHO Care is performing relative to its overall projections.

Exhibit ECHO.1: Total Number of ECHO Participants, by HCIA Quarter



For the group of participants enrolled during the period from January 1 through March 31, 2015,

- Age Cohort: Participants ages 50 to 59 years comprise the single largest group (29 percent), followed by those ages 40 through 49 years (23 percent) and ages 30 through 39 years (22 percent).
- Gender: The group is evenly divided between men and women, with women comprising 50 percent of the participant population.

The awardee has not reported data on the age distribution or racial and ethnic identity of participants.

Update: Implementation Experience in Third Year of Award

Since NORC's site visit to U New Mexico in 2014 and our first annual report, ECHO Care has made considerable progress in establishing transparent and mutually satisfactory referral, care management, and payment arrangements between the MCOs and the OIT sites, as detailed below. The awardee reports that the budget planning and formal review process instituted for 2015 has been very successful.

The unavailability of Medicaid data from the State at the outset of the program prevented ECHO Care from recruiting participants using claims-based risk algorithms, as originally planned. Instead, diagnostic information provided by the referring MCOs was the basis for patient recruitment by OITs. This

[138] The awardee reports enrollment distributions, as well as distribution of enrollment by age and gender, in its quarterly narrative progress report to CMMI. We use this source for the data presented here.

provisional arrangement was considered less than adequate by both the MCOs and ECHO Care: the MCOs were initially concerned that the OITs were serving plan enrollees that the plan's own care managers could handle, and the ECHO Care program perceived that the health plans referred only those plan enrollees with the most extreme problems, such as serious mental illness and/or substance use. Both ECHO Care leaders and the MCOs acknowledge the prevalence of these disorders among the patients served by ECHO Care, and the program has gained deeper experience in serving this population.

Notable updates in our understanding of ECHO Care are as follows:

Communications and Health IT. ECHO Care is supported by a dedicated health IT system and software that enables communication between OITs and the central UNM ECHO Care staff, including the sharing of case management notes and electronic health records. ECHO Health, introduced during the summer of 2014, simplified the enrollment process, replacing faxed enrollment and consent forms with scanned documents uploaded to the new system. ECHO Health required the migration of patient enrollment data from three separately maintained databases to a single repository and represents a major data coordination effort between ECHO Care's IT staff, OITs, and MCOs to ensure accurate and timely reporting of member months. As the individual clinic sites also have their own EHRs, the OITs double-enter information into the local EHR and ECHO Health. A web-based portal allows OITs to enter data that the UNM team can then pull for monitoring and evaluation.

Between March and June 2015, MCOs were granted increasingly comprehensive access to ECHO Health for their enrolled patients, initially to encounter summaries, care plans, contact information, and social components, and then to information about dis-enrolled and referred patients as well. The MCOs also have the ability to run their own reports from ECHO Health to keep the ECHO Care patient data synchronized with their organization's databases.

Patient and Caregiver Engagement. The OITs address chronic disease self-management, with nurses and community health workers (CHWs) playing a primary role in coaching patients in both clinic and home settings; in addition to symptom management. Self-advocacy in navigating the health care system is also a component of patient engagement work. While each OIT team serves distinct populations that reflect somewhat unique health and psychosocial challenges in their respective areas, there is an overall level of consistency and central program office support for patient engagement, for example, provided through staff training and ongoing peer support.

Engagement begins with CHWs and nurses conducting an initial home visit to assess the client's needs and begin the care planning process, involving clients in considering their medical and non-medical needs. Engagement continues through regular check-ins and home visits, accompanying clients to doctor's appointments, and collaborating on an ongoing basis in the re-evaluation of client goals. These interactions are calibrated according to need and are weekly for the first 30 days of enrollment or discharge from the hospital, to address the risk of readmission and establish relationships between the OIT and the client.

Fidelity, Adaptability, and Self-Monitoring. ECHO Care operates as a new application of the established ECHO Care model. While it enjoys the benefits of an experienced core team of consultants and existing

telecommunications resources and applications, it also has required a new level of collaboration among the university-based specialists, as they are asked to address the problems of patients with multi-morbidities, and from the ECHO Care central staff, which must establish and situate multidisciplinary OITs, rather than interact with existing primary care providers, as Project ECHO's individual specialty clinics does. ECHO Care's constructive engagement with the New Mexico MCOs is evidence of its adaptability and capacity for modification in light of changing circumstances. Self-monitoring and continuous quality improvement are part of the Project ECHO approach; an internal evaluation team that has designed and fielded training and provider surveys, and the awardee's internal evaluator, John Billings at New York University, analyzes health plan utilization, implementation, and program effectiveness.

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee.

The lack of timely Medicaid data for New Mexico has limited our evaluation to date. New York University (NYU), a subcontractor to the University of New Mexico in support of ECHO Care, has modified its data use agreement with the State of New Mexico to allow NORC to reuse Medicaid data provided to NYU researcher John Billings for recruitment targeting and program monitoring and assessment. Although we expected to present initial findings based on the NYU analytic data set in this second annual report, NYU researchers encountered problems with the Medicaid data that were not resolved in time to do so. NORC expects to report findings based on New Mexico's Medicaid data in a subsequent quarterly report.

U New Mexico Surveys of Patient Satisfaction and Workforce and Training Experience

Patient Satisfaction Survey

U New Mexico Project ECHO conducted a survey of ECHO Care patients at enrollment, with 78 respondents, and conducted the same survey six months later (n=38), to identify trends in patient satisfaction among intervention participants. Overall, the survey results were positive in all domains, including overall patient satisfaction, timeliness of care, medication management and self-management, and care coordination. Key findings are highlighted below.

Satisfaction with primary health care. The percentage of patients who rated their primary health care team the best possible increased from 28 percent of patients at enrollment in ECHO Care to 76 percent of patients six months later. Likewise, the percentage of patients who responded that they are very satisfied with the care they have received in the last 6 months increased from 29 percent of patients at baseline to 82 percent of patients at the point of the six-month follow-up survey.

Timeliness. Patients experienced greater timeliness of care once enrolled in ECHO Care. At enrollment, in the baseline survey, only 25 to 35 percent of patients reported that care was timely or accessible, including being able to receive care, make appointments, or get answers to their medical questions. Six

months following the baseline survey, however, between 50 and 76 percent of respondents reported that their care was timely and accessible.

Help with medications. Respondents reported modest increases in medication supports through ECHO Care. At the six-month follow-up, 66 percent of patients always found the instructions on how to take their medicines easy to understand, an increased from 55 percent of patients at baseline.

Self-management and patient engagement. Of the six-month survey respondents, a majority reported they felt positively about self-management, education, and goal-setting. The percentage of patients who discussed specific goals for their health with a member of their primary health care team increased from 47 percent at baseline to 84 percent of patients at the point of the six-month follow-up.

Social supports and care coordination. Patients reported large improvements in wraparound services and care coordination from baseline to six months following enrollment. Enrollees experienced a large increase in help with social services (e.g. housing, transportation or food assistance) from baseline to six-month follow-up, increasing from nine percent of patients at baseline reporting receiving such help to 61 percent of patients. Similarly, the percentage of patients who reported seeing a member of their primary health care team when sick increased from 24 percent at enrollment to 82 percent of patients six months later.

Staff Survey

U New Mexico also designed and conducted a robust survey of the ECHO Care Team, with responses from a total of 22 Outpatient Intensivist Team (OIT) members, comprised of physicians, physician assistants, nurses, community health workers (CHWs), mental/behavioral health professionals, and administrative assistants. Highlights of the 71-question survey results follow.

Care model. Staff report overall satisfaction with the ECHO Care model. Responses are overwhelmingly positive, with 82 percent of respondents agreeing or strongly agreeing that they are satisfied with the ECHO Care model, with 18 percent neutral and none dissatisfied. Similarly, respondents believe that patients were satisfied with the team-based model of care, with 77 percent agreeing or strongly agreeing.

Roles and responsibilities. Seventy-three (73) percent of respondents report having "major new responsibilities" as part of their role on the ECHO Care team, and 73 percent agree or strongly agree that their new responsibilities led to better patient care. Respondents are motivated to participate in Project ECHO by a number of factors, with almost all respondents wanting to improve access to specialty care for their patients (95 percent agreed or strongly agreed) or to care for patients with chronic, complex diseases (91 percent agreed or strongly agreed).

Respondents note there was an integrated team care approach, and 96 percent agree or strongly agree that the ECHO Care team is committed to working together to provide good patient care. However, 55 percent of respondents indicate they would prefer working on a team where it is clear who is in charge (41 percent agreed and 14 percent strongly agreed).

Training. Responses are split on the Project ECHO trainings. When asked if the initial training by Project ECHO enhanced the quality of care provided by the team, 32 percent agree or strongly agree, 32 percent were neutral, and the remaining third disagree or strongly disagree. Additionally, 41 percent of respondents explain that the Project ECHO training did not adequately prepare them for their jobs, with only 19 percent reporting they felt adequately prepared; 36 percent were neutral.

Job satisfaction. Respondents express positive views about their work and colleagues. Staff respect their fellow team members, are willing to share responsibility, and feel they continue to gain expertise through their work. Sixty-four (64) to 87 percent of respondents agree or strongly agree with these statements and only 0 to 5 percent disagree or strongly disagree. In particular, 87 percent of respondents note that learning to provide care for complex patients has increased their professional satisfaction. Additionally, a total of 86 percent of respondents report feeling fulfilled in their job, with 50 percent strongly agreeing.

Summary

University of New Mexico Surveys. U New Mexico conducted consumer and workforce surveys for their ECHO program. For the consumer survey, results from patients were positive in all question domains, including overall patient satisfaction, timeliness of care, medication and self-management, and care coordination. In the workforce survey of the ECHO care team, although there were mixed responses regarding training, respondents reported satisfaction with the intervention model, teamwork, and job tasks.

Sustaining and Scaling ECHO Care. The awardee has almost a decade of experience in successfully developing ECHO as a model within the state of New Mexico and has the support of the New Mexico Department of Health and the Department of Human Services (Medicaid agency). The awardee has also served as an advisor on the replication and scaling up of ECHO by other academic medical centers, other states (Washington), nationally through the U.S. Department of Veterans Affairs and U.S. Department of Defense, and globally through projects in India. The awardee is developing plans for sustaining ECHO Care, with its focus on serving high-risk Medicaid patients within New Mexico, in collaboration with the State's MCOs, possibly to expand eligibility criteria for the model, and to explore a shared savings arrangement between the MCOs and the OITs.

References

Billings J, Geurghiou T, Blunt I, Bardsley M. "Choosing a Model to Predict Hospital Admission: An Observational Study of New Varients of Perdictive Models for Case Finding." *BMJ Open* 3, (2013): e003352.

Billings J, Mijanovic T. "Improving the Management of Care for High-Cost Medicaid Patients." *Health Affairs* 26, no. 6 (2007): 13.

Billings J, Raven MC. "Dispelling an Urban Legend: Frequent Emergency Department Users Have Substantial Burden of Disease " *Health Affairs* 32, no. 12 (2013): 2099-2108.

"Data Flow Booklet." U New Mexico, 2014.

Echo Care Team Survey Report. U New Mexico, 2015.

HCIA 11QR Quarterly Reporting for University of New Mexico Health Sciences Center, for Reporting Quarter End Date 3/31/2015. Submitted by U New Mexico, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by U New Mexico, 2015

"Iot Service Code Sheet." U New Mexico, 2014.

Patient Satisfaction Survey Report. U New Mexico, 2014.

Preliminary Analysis Echo Utilization and Costs. U New Mexico, 2015.

Sanjeev A, Geppert C, Kalishman S, Dion D, et al. "Academic Health Center Mangement of Chronic Diseases through Knowledge Networks: Project Echo." *Academic Medicine.* 82#2 (2007): e31802d8f68.

Sanjeev A, Kalishman S, Dion D, Som D, et al. "Partnering Urban Academic Medical Centers and Rural Primary Care Clinicians to Provide Complex Chronic Disease Care." *Health Affairs* 30, no. 6 (2011): doi:10.1377/hlthaff.2011.0278.

Sanjeev A, Kalishman S, Thornton K, Doin D, et al. "Expanding Access to Hcv Treatment - Extension for Community Healthcare Outcomes (Echo) Project: Disruptive Innovation in Specialty Care." *Hepatology* 52, no. 3 (2010): 1124-1133.

Sanjeev A, Thornton K, Jenkusky SM, Parish B, et al. "Project Echo: Linking University Specialists with Rural and Prison-Based Clinicians to Improve Care for People with Chronic Hepatitis C in New Mexico." *Public Health Reports* 122#2 (2007): 74-77.

Sanjeev A, Thorton K, Murata G, Deming P, et al. "Outcomes of Treatment for Hepititis C Virus Infection by Primary Care Providers." *New England Journal Of Medicine* 364#23 (2011): 2199-2207.

Sanjeev A, Thorton K, Komaromy M, Kalishman S, et al. "Demonopolizing Medical Knowledge." *Acad. Med.* 89#1 (2014): 30-32.

University of North Texas Health Science Center

This chapter updates NORC's evaluation of the University of North Texas Health Science Center's Brookdale Senior Living Transitions of Care (BSLTOC) initiative. The Transitions of Care program adapts a set of quality improvement tools, the Interventions to Reduce Acute Care Transfers (INTERACT) suite, for use in Brookdale Senior Living skilled nursing (SNF), assisted living (AL) and AL/memory care (MC), and independent living (IL) residences as well as, home health (HH) agencies. With the ultimate goal of reducing hospital readmissions, the INTERACT tools also serve to formalize the communication process on patient status, provide standardized patient care procedures, create a paper trail, and ensure a warm handoff between hospitals and Brookdale facilities. HCIA funds have been used to implement the INTERACT program in multiple Brookdale facilities across four states.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness.

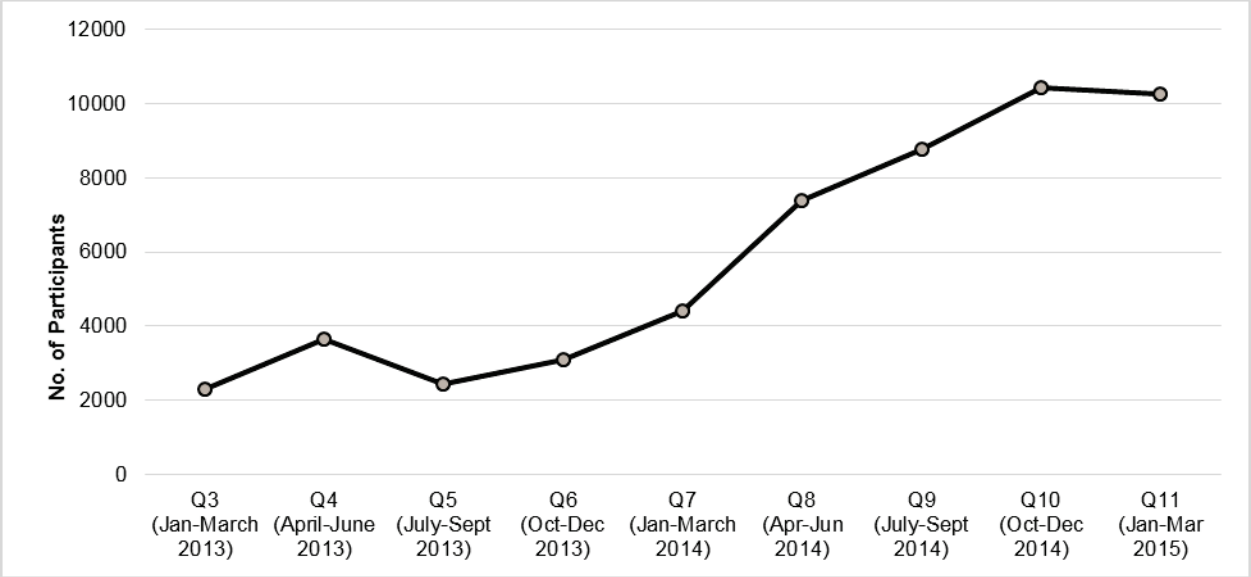
Overview of Awardee

CMMI Category for Awardee:	Academic/University
Funding Amount:	$7,329,714
Launch Date:	11/30/2012
States Where Located:	Colorado, Florida, Kansas, Tennessee, Texas

Patients Targeted and Served

Self-reported data from the University of North Texas provide participation by HCIA reporting quarter, as seen in Exhibit BSLTOC.1. Counts are of patients and residents who are considered to be indirect participants (receiving services from staff trained under the HCIA grant but whose services are not directly funded by the grant). The data show a general increase over time, with more rapid growth since Q7. During the most recent quarter for which data are available (January 1 through March 31, 2015), the awardee reports that the Transitions of Care intervention served 10,249 residents. The awardee's self-reported data through June 30, 2014 (HCIA Reporting Quarter 8), indicate a cumulative total of 11,248 unique participants from the skilled nursing, assisted living, and independent living arms of the intervention; we do not have an explanation for the discrepancy between the higher cumulative total count (as of June 30, 2014) and the awardee's lower report of enrollees served as of March 31, 2015, in their Q11 report to CMMI.

Exhibit BSLTOC.1: Total Number of BSLTOC Participants, by HCIA Quarter



For the group of residents participating in the BSLTOC intervention during the period from January 1 through March 31, 2015, most were female (68 percent) and 75 years of age or older (86 percent). The awardee's self-reported data to CMMI does not include information on the racial or ethnic identity of participants.

Update: Implementation Experience in Third Year of Award

Since NORC's first site visit (October 2014) and our first annual report (September 2014), Brookdale has continued to implement INTERACT in various care settings, ranging from SNF to IL facilities. While the first site visit to Brookdale Senior Living's Austin, TX market focused on implementation of INTERACT in skilled nursing (SNF), assisted living (AL), and home health (HH), the second site visit to two continuing care retirement in BSL's Jacksonville, FL market focused on implementation for independent living (IL), as well as additional observations related to AL and HH. Brookdale describes the Austin and Jacksonville cases as the most successful of BSL's many implementation sites. In Jacksonville, we met with the INTERACT leadership team, the data management team, managers and key staff at the BSL residences, training staff, a hospital partner, staff involved in implementation, and Jacksonville Independent Living residents who have opted-in to participate in INTERACT. We visited Cypress Village, which is a life care community, and The Atrium, a non-life care (monthly rental) community. This visit also involved an interview with the director of an INTERACT pilot in a HH setting in Nashville and a meeting with project leadership about an advanced care planning learning collaborative that Brookdale is testing on a small sample of communities.

Communication and Health IT. BSL employs a subcontractor, Loopback Analytics, for assistance with data sharing, monitoring, and analytics. Loopback has created an IT platform that BSL sees as a competitive edge for marketing its post-acute care services to hospitals. There are three IT systems used in BSL facilities, including Medex, HomeCare/HomeBase, and SNF platform Point, Click, Care (PCC).All data resides on the Loopback server. INTERACT includes tools and modules to facilitate

communications among clinical and non-clinical BSL staff, as well as between BSL and hospitals to which BSL-affiliated residents and home health clients are admitted and from which they are discharged. Topics for communication generally include advanced care planning, symptom management, decision support around care paths, and quality improvement related to transitions among care settings.

Brookdale has faced significant challenges related to communication. Brookdale has experienced some difficulties transferring data from paper to electronic and vice versa, especially when transferring information during an emergency. BSL is also actively exchanging data and communicating with nearly 100 high-referral hospital partners in multiple states as part of their goal to improve patient handoffs. The awardee has described data sharing agreements with hospitals as the largest roadblock, particularly when involving the larger health care systems.

Patient and Caregiver Engagement. The degree of engagement with residents and caregivers varies with the intervention arm, with very limited engagement for informal family caregivers of participants residing in SNF, AL and AL/MC settings, for whom the intervention may appear to be invisible, aside from participation in advanced care planning conversations. For residents in the HH and IL arms of the intervention, engagement is organized around residential facility (e.g., wellness center at an IL residence) or integrated into case management for home health. Participants are offered brochures, forms, and laminated cards that introduce two INTERACT tools, the Stop and Watch (S&W) and the Situation, Background, Assessment, and Recommendation (SBAR).

Licensed practical nurses at IL wellness centers host monthly luncheon events to introduce residents to aspects of the intervention and reinforce the use of both tools, as well as ongoing advanced care planning. Participants are encouraged to have one or more buddies among their fellow residents, for whom they will keep an informal eye on possible changes in condition; S&W is seen as a way to help residents determine whether a call to 911 is warranted or whether a change noted either about a buddy's status or one's own condition could be handled through communication within BSL.

While the impact of the intervention on provider communication and process measures related to BSL referrals is relatively well-documented, we have less information with which to understand the efficacy of patient engagement and caregiver supports for the HH and IL settings in which they would be expected to be visible to participating residents. During NORC's second site visit, focus groups were conducted with IL intervention participants at two BSL residences and with IL Associates. Participants spoke about the value of learning more about how to manage their own health and health care, although the roots of engagement clearly precede the introduction of INTERACT and reflect the shared circumstances and mutual interests of many residents. Few residents had completed an S&W form but most articulated a sense of responsibility for the health and well-being of fellow residents, within their common understanding of expectations around privacy and the non-medical setting. NORC's interview with a relatively new home health pilot based in Nashville gave us information about implementation progress but little about engagement or caregiver support to date.

In addition to the use of Stop and Watch and SBAR tools, advanced care planning is an aspect of patient engagement and caregiver support within the intervention. Over the past year, the awardee and BSL have

committed management resources and time toward enriching the extent of advanced care planning conversations that take place with residents in all intervention arms.

Fidelity, Adaptability and Self-Monitoring. BSL has adapted the INTERACT program to fit the clinical workflow and residential arrangements within BSL communities. For example, the INTERACT software has been adapted for each care setting with SNF requiring the least modification, slight modification for AL, transferring from paper to electronic tools for HH, and creating new tools for IL. In order to maintain fidelity to the original model, Brookdale continuously trains new staff on how to use INTERACT. Self-monitoring is also a continuous process in BSL communities. INTERACT forms automatically generate quality improvement tools that BSL uses to monitor INTERACT processes/outcomes. Each facility has a team that meets once a week to discuss any patient readmissions, how INTERACT was used, and how the process can be improved in the future. In addition, BSL is actively exchanging data and communicating with high-referral hospital partners about the transitions between hospital and BSL facilities in order to ensure warm handoffs.

Program Effectiveness

NORC's evaluation analyses claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. In this section, we present two sets of findings:

- Time series analysis of claims for beneficiaries in fee-for-service (FFS) Medicare for the assisted living (AL) and memory care (MC) arms of the BSLTOC intervention, without a comparison group, and
- Difference-in-differences (DID) analysis for FFS Medicare beneficiaries in the skilled nursing (SNF) arm of the BSLTOC intervention, with a comparison group.

Our analysis is limited to program participants with FFS Medicare coverage over the period January 1, 2013, through December 31, 2014. This report includes findings for core utilization and cost measures.

Measures. For the AL/MC program, findings are presented for:

- All-cause hospitalizations per 1,000 beneficiaries
- Emergency department (ED) visits per 1,000 beneficiaries
- 30-day readmissions per 1,000 beneficiaries
- Total quarterly cost of care per beneficiary
- Ambulatory care sensitive (ACS) hospitalizations per 1,000 beneficiaries

For the SNF program, findings are presented for:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day ED visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes

- 90-day total cost of care per beneficiary-episode
- 30-day total cost of care per 1,000 beneficiary-episodes

Research Questions. For each measure, we address the following research questions:

- AL/MC Program: for each measure, what is the change in outcome for BSLTOC participants after the introduction of the intervention in their residential facility (AL, MC) from their experience during the eight quarters prior to its introduction?

- SNF Program: for each measure, what is the difference in changes in outcome between FFS Medicare beneficiary-episodes seen at BSLTOC SNFs and those in a comparison group, from before until after implementation of the INTERACT program, adjusting for differences in outcomes at baseline and risk factors across both populations?

Analytic Approach. We present findings from two analyses:

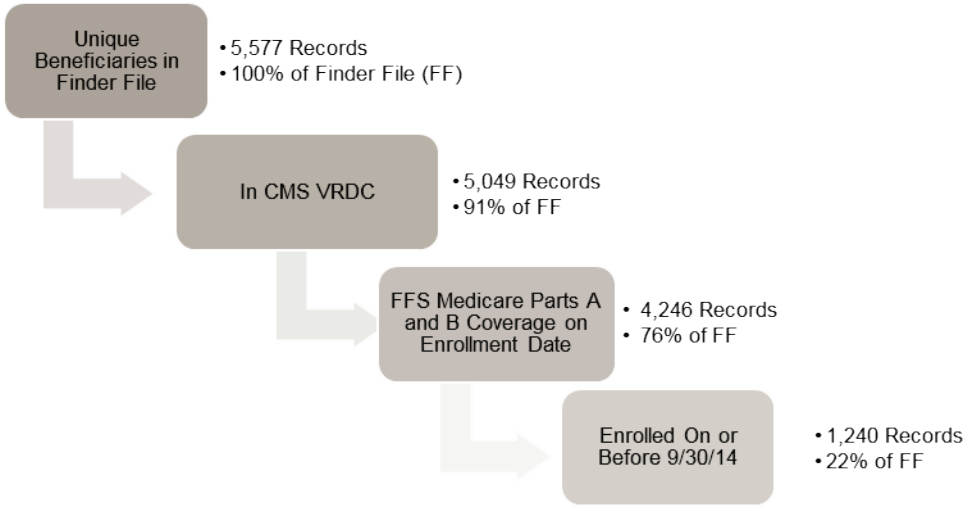
- For AL/MC residents, a time series analysis, comparing their experiences between the pre- and post-intervention implementation periods.

- For SNF patients, we specify and employ two models: a time series analysis, comparing the experiences of participants in the SNF program between the pre- and post-intervention implementation periods; and a DID model, comparing the changes in outcomes for FFS Medicare beneficiaries discharged from BSLTOC SNFs with those for a comparison group between the pre- and post-intervention periods.

Finder File and Creation of Analytic Sample. For the AL/MC program, Brookdale Senior Living provided a finder file listing program participants and date on which the intervention became active in the AL or MC facility, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[139] As shown in Exhibit BSLTOC.2, the finder file identified 5,577 unique participants in the AL/MC program. We matched 5,049 of these individuals to Medicare beneficiary identifiers in the CMS Virtual Research Data Center (VRDC), and 4,246 of these were FFS Medicare during the month of program enrollment. Of these participants, 1,240 were in facilities in which the intervention became active on or before September 30, 2014, and were thus included in our final analytic sample.

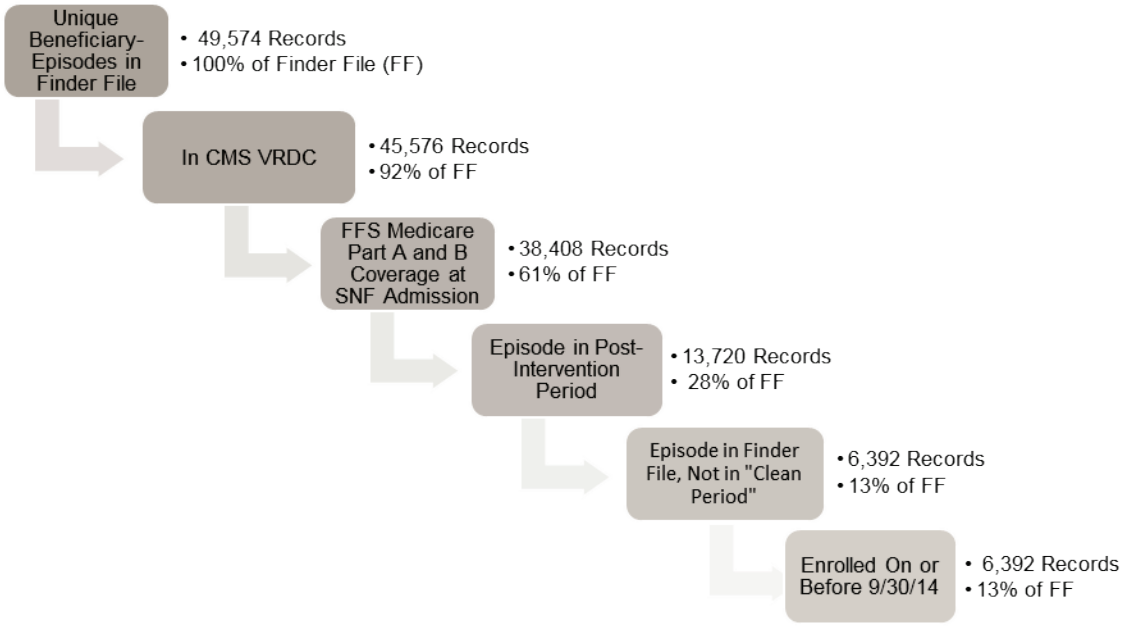
[139] Medicare claims are available through December 31, 2014, for the analysis in this report. We used September 30, 2014, as the cut-off date to account for a 90-day claims runoff.

Exhibit BSLTOC.2: FFS Medicare Beneficiaries Identified Through the UNT-Brookdale AL/MC Finder File



For the SNF program, Brookdale Senior Living provided a finder file of SNF patients participating in the intervention and their date of admission to the SNF, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures. As shown in Exhibit BSLTOC.4, the finder file identified 49,579 unique beneficiary-episodes, of which 13,720 were matched to a Medicare identifier in the VRDC enrolled in Medicare FFS at the time of SNF admission, and occurred in the post-intervention period. We then dropped beneficiary-episodes associated with a SNF admission within 90 days of any previous SNF admission occurring during the post-intervention period for that individual, to create a "clean period" to account for overlapping SNF claims. This yielded a sample of 6,392 beneficiary-episodes for the BSLTOC SNF program in the post-intervention period.

Exhibit BSLTOC.3: FFS Medicare Beneficiary-Episodes Identified Through the UNT-Brookdale SNF Finder File



Analysis 1: BSLTOC AL/MC Intervention

Model. To answer our research question, we employ population-averaged logistic models with binary outcome variables for utilization measures (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a time-series generalized estimating equation (GEE) model that accounts for repeated measures across beneficiaries. The models are specified as:

$$Y_{it} = \boldsymbol{\alpha} Time_t + \boldsymbol{\beta} Patient_i + \varepsilon_i$$

Here Y_{it} is the outcome variable for the i^{th} beneficiary in the t^{th} Time vector. Time is specified as an indicator variable denoting the post-intervention period; $\boldsymbol{\alpha}$ is a vector of effects corresponding to the relevant time variables in the models; Patient is a vector of patient demographic and clinical variables; and $\boldsymbol{\beta}$ is a vector of effects corresponding to the relevant patient variables in the models. For more information on logistic and GEE models, please refer to Appendix C. In our models, the primary outcome of interest is the difference of $\boldsymbol{\alpha}$ for the post-intervention period and $\boldsymbol{\alpha}$ for the pre-intervention period.

Results

Descriptive Characteristics. Exhibit BSLTOC.4 displays the descriptive characteristics of the BSLTOC AL/MC Medicare FFS beneficiaries, with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment characteristics. Of the 1,240 patients in our analytic file, the average number of quarters of enrollment was 5.2, with the longest enrollment being six quarters. Almost three-quarters (72 percent) of the participants are female, the majority are White (97 percent), and one-fifth are 85 years of age or older. Almost all participants gained Medicare coverage at age 65 years, and very few are enrolled in Medicaid as well as Medicare.

Exhibit BSLTOC.4: Descriptive Characteristics for BSLTOC AL/MC Residents in Intervention Facilities

Variable	Value
Number of Persons	1240
Mean Number of Quarters Enrolled [Range]	5.2 [2 - 6]
Gender % (N)	
Female	72.4 (898)
Age Group % (N)	
<70 years	1.0 (13)
70-74 years	2.4 (30)
75-79 years	4.4 (55)
80-84 years	9.6 (119)
≥85 years	20.6 (256)
Race/Ethnicity % (N)	
White	96.8 (1200)
Black	1.6 (20)
Other	1.6 (20)
Dual Eligibility % (N)	
Dually Enrolled	1.2 (15)
Coverage Reason % (N)	
Age	96.4 (1195)
Disability	3.5 (44)
ESRD	0.1 (1)
Hierarchical Chronic Conditions (HCC)	
Mean HCC Score (SD)	2.0 (1.3)
Mean Count of HCCs (SD)	3.2 (2.6)
Mean Utilization and Cost in Year Prior to Program Enrollment	
Total Medicare Cost (SD)	$26,670 ($35,803)
Hospitalizations per 1,000 (SD)	704.0 (1042.4)
ACS Hospitalizations per 1,000 (SD)	150.8 (476.1)
30-Day Readmissions per 1,000 (SD)	104.0 (424.8)
ED Visits per 1,000 (SD)	831.5 (1286.2)

Time Series Analysis. We present and discuss the differences in cost and utilization for the AL/MC program below and in Exhibit BSLTOC.5.[140] The results for utilization outcomes (hospitalizations, ACS hospitalizations, 30-day readmissions, and ED visits) show the adjusted marginal difference for the post-intervention period from population-averaged logistic models for the number of participants with the outcome, and the result shown for total cost of care is the adjusted marginal difference for the post-intervention period from the gamma distribution GEE model.

The model-based estimates indicate the following:

- Utilization measures: We observe significant increases in hospitalizations and ED visits of 23.1 and 18.6 per 1,000 beneficiaries, respectively, in the post-intervention period.

[140] Adjustment factors include age, gender, race/ethnicity, extent of FFS coverage, extent of dual coverage, original coverage reason, HCC score, and disability indicator.

- Cost: We observe a significant increase of $1,833 in total quarterly cost of care per beneficiary in the post-intervention period.
- Quality of Care Measures: We observe significant increases in 30-day readmissions and ACS hospitalizations of 6.1 and 8.2 per 1,000 beneficiaries, respectively, in the post-intervention period.

Exhibit BSLTOC.5: Utilization and Cost Differences for BSLTOC AL/MC Program Participants Before and After Implementation

Variable	Adjusted Difference [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**23.1 [11.7, 34.6]*** **
ED Visits (Likelihood per 1,000 Beneficiaries)	**18.6 [6.6, 30.6]** **
30-Day Readmissions (Likelihood per 1,000 Beneficiaries)	**6.1 [1.4, 10.8]** **
Total Quarterly Medicare Cost per Beneficiary ($)	**$1,833 [$1,434, $2,232]*** **
ACS Hospitalizations (Likelihood per 1,000 Beneficiaries)	**8.2 [2.2, 14.2]** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This AL/MC pre–post analysis captures the health trajectory of an older population as they age, just before and just after the institution implemented INTERACT. Any conclusions about whether the AL/MC treatment population is doing better or worse after the intervention launched at their residence must be based on a DID analysis that uses a well-matched comparison group. We are investigating the feasibility of identifying a pool of comparator AL/MC residents to construct a comparison group for participants in the AL/MC program.

Analysis 2: BSLTOC SNF Intervention

Time Series Model. To determine program effectiveness for the SNF BSLTOC program, we employ a logistic model with binary utilization outcomes. For cost of care, we use a generalized linear model (GLM) with the appropriate functional form for the dependent variable. The models are specified as:

$$Y_{it} = \beta_0 + \beta_1 \text{ Quarter}_t + \beta_3 \text{ Beneficiary-Episode}_i + \varepsilon_{it}$$

Here Y_{it} is the outcome variable (binary for utilization and continuous for cost) for the i^{th} beneficiary-episode from the BSLTOC SNF program. Quarter is a dummy variable for the post-intervention period, and Beneficiary-Episode is a vector of beneficiary-episode demographic and clinical variables.

DID Model. We also compare changes in outcomes between the entire pre-intervention period and post-intervention period of a subset of BSLTOC SNF beneficiary-episodes with similar beneficiary-episodes in non-participating SNFs in a DID analysis. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{ Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect for each of four groups using combinations of β_1 (indicator for beneficiary-episode occurring at intervention practice); β_2 (indicator for intervention implementation period); and β_3

(an interaction term enabling the estimation of the treatment effect during the post-implementation period).

We incorporate propensity scores into both our time series and difference-in-differences models with standardized mortality ratio (SMR) weighting in order to minimize differences between beneficiary-episodes in the pre- and post-intervention periods. For a more detailed explanation of SMR weighting, please refer to Appendix C.

Comparison Group. For the DID analysis, we identify a comparison group of beneficiaries discharged to seven SNFs associated with six hospitals with whom BSLTOC has a strong relationship and ongoing data exchange. Three of the hospitals used to identify the comparison group were located in Florida (Baptist Health in Jacksonville; Tampa General in Tampa; and St. Vincent's Health System Southside in Middleburg), and three were located in Texas (St. David's Medical Center, St. David's South Austin Medical Center, and St. David's North Austin Medical Center; all located in Austin, TX). To ensure similarity to our comparators, we restrict our analysis to the BSLTOC SNF beneficiary-episodes discharged from these six hospitals. Thus, our final analytic sample for the DID analysis has 1,584 BSLTOC SNF beneficiary-episodes and 2,172 comparison beneficiary-episodes.

Results

Descriptive Characteristics. Exhibit BSLTOC.6 displays the characteristics of BSLTOC SNF beneficiary-episodes before and after implementation of the intervention. We compare SNF admissions occurring in the pre- and post-intervention periods with respect to demographics, comorbidities, and prior utilizations. We then test differences between the two periods using a t-test for continuous measures and a chi-square test for categorical measures. We observe differences in age, race/ethnicity, comorbidities (mean count of HCCs, HCC score), hospitalizations and total Medicare cost in the prior year, original reason for Medicare coverage, and discharge disposition. Because of these observed differences in characteristics, we incorporate propensity scores into our models with SMR weighting.

Exhibit BSLTOC.6: Descriptive Characteristics for BSLTOC SNF Program Enrollees, Pre and Post Implementation

Variable	Pre-Intervention	Post-Intervention
Number of Beneficiary-Episodes	9,543	6,392
Age* % (N)**		
<65 years	2.4 (229)	3.6 (230)
65-69 years	4.9 (469)	6.5 (418)
70-74 years	8.2 (778)	9.4 (603)
75-79 years	13.8 (1320)	13.4 (859)
80-84 years	21.4 (2045)	20.4 (1304)
≥ 85 years	49.3 (4702)	46.6 (2978)
Race/Ethnicity* % (N)**		
White	94.7 (9038)	94.1 (6016)
Black	3.8 (360)	3.8 (240)
Other	1.5 (145)	2.1 (136)
Gender % (N)		
Female	66.3 (6330)	67.1 (4289)
Hierarchical Condition Categories (HCCs)		
Mean Count of HCCs (Standard Deviation)*	4.7 (3.2)	4.6 (3.0)
Mean HCC Score (SD)***	2.8 (1.8)	2.8 (1.7)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Hospitalizations per 1,000 (SD)***	2,058 (2,464)	1,946 (2,622)
ED Visits per 1,000 (SD)	962 (1,561)	967 (1,643)
Total Medicare Cost (SD)***	$44,205 ($50,335)	$41,711 ($49,112)
Coverage Reason* % (N)**		
Age	91.8 (8758)	89.2 (5701)
Disability	7.9 (752)	10.3 (658)
ESRD	0.1 (10)	0.3 (16)
Disability and ESRD	0.2 (23)	0.3 (17)
Discharges* % (N)**		
Home	50.7 (4837)	76.4 (4886)
SNF	1.5 (144)	1.8 (118)
Hospice	0.4 (37)	0.6 (38)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Time Series Analysis. We present and discuss the differences in cost and utilization for the SNF program below and in Exhibit BSLTOC.7.[141] The results displayed below for service use outcomes (90-day hospitalizations, 30-day readmissions, and 90-day ED visits) show the adjusted marginal difference for the post-intervention period from population-averaged logistic models for the number of participants with the outcome, and the result shown for total cost of care is the adjusted marginal difference for the post-intervention period from the gamma distribution GEE model.

The model-based estimates indicate the following:

- Utilization measures: We observe a non-significant increase in 90-day hospitalizations (0.8 per 1,000 episodes) and a non-significant decrease in 90-day ED visits (-3.6 per 1,000 episodes) in

[141] Adjustment factors include age, gender, race/ethnicity, original coverage reason, prior year utilization, HCC score, and SNF provider.

the post-intervention period. A decrease in readmissions (-10.8 per 1.000 episodes) falls slightly short of statistical significance.

- Cost: We observe a significant decrease of $1,646 in total 90-day cost of care per episode in the post-intervention period.

Exhibit BSLTOC.7: Utilization and Cost Differences for BSLTOC SNF Program Participants Before and After Implementation

Variable	Adjusted Difference [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	0.8 [-14.6, 16.2]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-3.6 [-17.9, 10.6]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	-10.8 [-22.1, 0.4]
90-Day Total Cost of Care per Beneficiary-episode ($)	**-$1,646 [-$2,178, -$1,115]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

DID Analysis. As stated above, the DID analysis includes only beneficiary-episodes discharged from six hospitals in Florida and Texas for which appropriate comparison discharges could be identified (1,584 BSLTOC SNF beneficiary-episodes and 2,172 comparison beneficiary-episodes). Results presented in Exhibit BSLTOC.8 represent the difference in average outcome between the BSLTOC SNF intervention group and the comparison group *after* the implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* the implementation of the intervention. This model assesses the impact of the BSLTOC SNF program in these six hospitals across the entire post-implementation period.

The model-based estimates indicate the following, relative to the comparison group:

- Utilization measures: We observe a non-significant increase in both 30-day readmissions and 90-day hospitalizations (23.5 and 22.5 per 1,000 episodes, respectively) and a non-significant decrease in 90-day ED visits (3.9 per 1,000 episodes) in the post-intervention period.
- Cost: We observe decreases in both 30-day and 90-day total cost of care per episode in the post-intervention period ($1,031 and $2,025, respectively) that do not reach statistical significance.

Exhibit BSLTOC.8: Difference-in-Differences Estimates for the BSLTOC SNF Beneficiary-Episodes

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	22.5 [-37.6, 82.6]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-3.9 [-59.1, 51.4]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	23.5 [-25.6, 72.5]
30-Day Total Cost of Care per Beneficiary-episode ($)	-$1,031 [-$2,605, $543]
90-Day Total Cost of Care per Beneficiary-episode ($)	-$2,025 [-$4,613, $564]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. This analysis of the BSLTOC SNF program is limited by the lack of a comparison group for all of the patients in the set of SNFs participating in the intervention. We are investigating the feasibility of constructing a comparison group for a larger cohort of intervention SNFs and their partner hospitals in subsequent analyses.

Summary

Claims-based Analysis. Our quantitative results for the BSLTOC SNF program show a statistically significant reduction of 90-day cost of care relative to comparison SNF episodes during the pre-implementation period. In the DID analysis, which only includes a subset of BSLTOC SNF discharges, estimates of lower cost are not statistically significant. Results from our analysis comparing the utilization and cost of care for the AL/MC residents show a significant increase in hospitalizations, 30-day readmissions, ACS hospitalizations, ED visits, and total cost of care.

Sustaining and Scaling the Brookdale Senior Living Transitions of Care Program. The awardee applied for but did not receive a no-cost extension. BSL is planning to sustain and continue to scale the intervention but without access to the Medicare claims data that they have been able to purchase under the CMMI grant, their ability to document and report impacts will be more limited. However, BSL has committed to expanding INTERACT to all 74 BSL SNF facilities around the country using the Point, Click, Care EHR. BSL is currently exploring the idea of developing a similar program, not necessarily with the INTERACT brand name, which may be implemented in the other BSL care settings. The benefits of the INTERACT in the IL setting have not been clearly defined, particularly as many of the program elements already appear to happen organically in the communities. It has also been difficult to assess utilization of IL tools so BSL has not confirmed future development in IL settings.

Loopback has created a health IT platform that enables Brookdale Senior Living to scale to other post-acute providers and share data with hospital corporations. BSL sees this platform as a competitive advantage for marketing its PAC services to hospitals. In addition, as hospitals become more committed to reducing readmissions, prospects will improve for scaling. The BSL pilot to implement INTERACT at its stand-alone home health agency in Nashville, TN, is also developing partnerships with non-BSL facilities to replicate.

References

Bedwell S, Fairchild TJ, O'Neil K. "Challenges of Implementing Interact in Assisted Living Settings." (2014). Unpublished poster presented at HCIA National Summit, 2014.

"Driver Diagram." University of North Texas Health Science Center, 2013.

Final Report on Pilot Test of Interact for Assisted Living Version 1.0 Tools and Interact for Home Helath Version 1.0 Tools. University of North Texas Health Science Center, 2014.

HCIA 11QR Quarterly Report for University of North Texas Health Science Center, for Reporting Quarter End Date 3/31/2015. Submitted by U North Texas, 2015.

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by U North Texas, 2015.

"Interact Tool Utilizaton by Care Setting, Target Audience, and Consent Requirements." University of North Texas Health Science Center, 2014.

Ouslander JG, Lamb G, Tappen R, Laurie Herndon L et al. "Interventions to Reduce Hospitalizations from Nursing Homes: Evaluation of the INTERACT Collaborative Quality Improvment Project." *Journal of the American Geriatrics Society* 59#4(2011): 745-753.

Ouslander JG, Perloe M, Givens JH, Kluge L, Rutland T, et al. "Reducing Potentially Avoidable Hospitalizations of Nursing Home Residents: Results of a Pilot Quality Improvement Project." *Journal of the American Medical Directors Association* 10#9(2009): 644-652.

University of Rhode Island

This chapter updates NORC's evaluation of the University of Rhode Island's Living RIte program. Living RIte Centers offer clinic- and home-based access to primary care, integrated with patient empowerment, social services referrals, and employment services for adults living with intellectual and developmental disabilities (I/DD) and/or Alzheimer's disease. Enrollees are dually eligible Medicaid and Medicare beneficiaries with I/DD who receive fee-for-service (FFS) benefits and Medicare FFS beneficiaries with Alzheimer's disease. As of March 10, 2015, all participants have been dually eligible for both Medicare and Medicaid. The awardee's goal is to locate a new type of integrated care at centers traditionally used to deliver social services and supports for persons living with I/DD; these centers are to deliver holistic services including peer coaching, recreation, socialization home-care, employment and as-needed medical attention.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness.

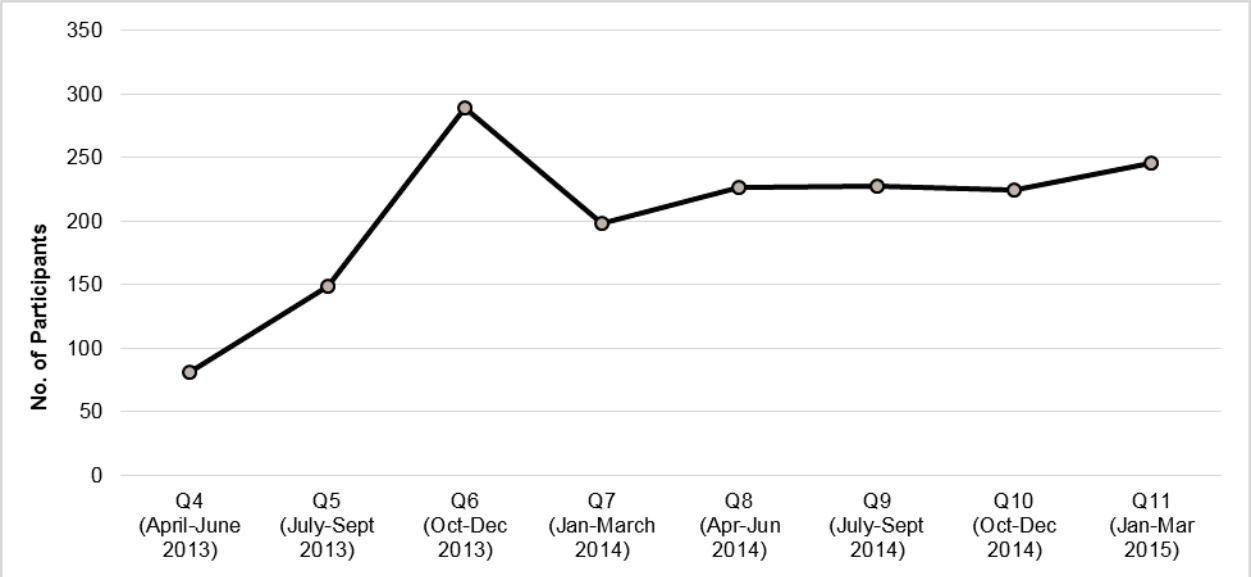
Overview of Awardee

CMMI Category for Awardee:	**Academic/University**
Funding Amount:	**$13,955,411**
Launch Date:	**5/1/2013**
State(s) Where Located:	**Rhode Island**

Patients Targeted and Served

Self-reported data from URI provides participant data by HCIA reporting quarter, as shown in Exhibit RIte.1. The data show a rapid increase through Q6 followed by a decline through Q7 and a leveling off since Q8. During the most recent quarter for which data are available (January 1 through March 31, 2015), Living RIte served 246 participants. As of March 31, 2015, the program had served a cumulative total of 323 unique participants since program launch, 66 percent of the total number projected to be served over the three years of the HCIA-funded program (491 participants).

Exhibit RIte.1: Total Number of Living RIte Participants (Direct and Indirect), by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: About 75 percent of those served are between the ages of 26 to 64 years of age. Another 13 percent are between 65 and 74 years, five percent are young adults ages 19 to 25 years, and seven percent are elders 75 years of age and older.
- Gender: Slightly more participants are female (52 percent) than male.
- Racial and Ethnic Identity: 94 percent of participants are identified as White. Three percent are identified as Black or African American and another three percent as Hispanic or Latino.

Update: Implementation Experience in the Third Year of Award

There have been a number of policy and health care market changes that have affected the Living RIte Centers' implementation experience. In 2014, the Department of Justice ordered a settlement and decree to end sheltered workshops in Rhode Island over the following 10 years, which included the partner organizations involved in Living RIte. In 2015, the financial alignment initiative began in Rhode Island, which affected the program enrollment through the partner Medicaid Managed Care organization Neighborhood Health Plan. Given these larger contextual exogenous factors, the program has continued to evolve and notable updates are as follows:

Communications and Health IT. The Living RIte program includes telemedicine services to be brought to the client to overcome transportation burdens that occur within this population. Since many participants live in group homes or residential facilities where staff time and resources can be limited, the telemedicine offers a way to reduce burden on staff. The telemedicine workflow includes sending a Living RIte staff person, generally a nurse, out to the location to connect to a nurse practitioner in the office setting. Unfortunately, the telemedicine system has had many technical challenges, such as

inconsistent video or sound, forcing the Living RIte staff to use cell phones to bring audio to the appointment.

Patient and Caregiver Experience. The Living RIte program supports patient engagement by the I/DD population beginning with the application process for Living RIte services. After meeting with a Living RIte provider to discuss health care needs and for an initial evaluation, patients will develop health care and well-being goals with the provider and an interdisciplinary team, which can include a Living RIte RN care coordinator, a dietitian, an occupational therapist, a physical therapist, a life coach, and a peer specialist. Services support goal attainment, including nursing care coordination, preventive services, telehealth visits, family mentoring, fall prevention, and home safety evaluation.

As a patient in a Living RIte Center, engagement continues to occur in a number of ways. For example, patients can take part in classes led by peer specialists on topics such as yoga, tai chi, and safety. Peer specialists, who also have I/DD, help to ensure a patient-centered learning environment where Center participants feel comfortable expressing their views and needs. Outside of a learning setting, peer specialists work with life coaches to draw out patients, assess new health issues and other challenges (e.g., transportation issues), and identify ways to address them. In addition, the Centers address other needs, such as employment counseling and job placement; benefits counseling; and volunteer opportunities.

Fidelity, Adaptability, and Self-Monitoring. As noted above, the Rhode Island healthcare market for groups serving patients with developmental disabilities has undergone large changes during the award period. The awardee has responded through continued attention and persistence. Living RIte signed a case management contract with Neighborhood Health Plan for referrals of high-risk or I/DD participants. Unfortunately, the conversion rate from referral to LRC enrollment was lower than expected, ranging from 10-20%. The Centers are expected to continue working with NHP to provide case management services for individuals who are not clients of the Centers in the future.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicaid and Medicare fee-for-service (FFS) beneficiaries served by URI's Living RIte program from January 1, 2012, through March 31, 2015. We use a comparison group of Medicare beneficiaries in Rhode Island, with additional information pulled from beneficiaries' Medicaid records. We find that URI's program, while showing relative reductions in utilization that are not statistically significant, does not appear to lower total Medicare cost.

Measures. Findings are presented for four measures:

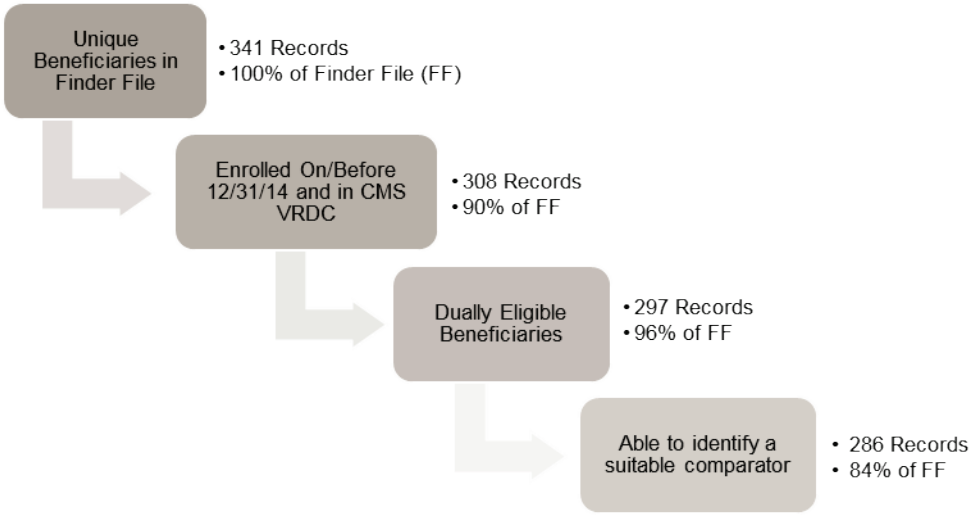
- All-cause hospitalization days per beneficiary
- Behavioral health hospitalization days per month per beneficiary
- Emergency department (ED) visits per beneficiary
- Total quarterly Medicare cost per beneficiary

Research Question. For each measure, what is the change in outcome on average between the pre-intervention and post-intervention period for Living RIte's enrollees, compared with the change in outcome for similar dually eligible beneficiaries in the State of Rhode Island, after adjusting for differences across both populations?

Analytic Approach. We use a DID analysis to compare changes in utilization and cost between dually eligible beneficiaries in URI's intervention and those in the comparison group in the pre- and post-intervention periods.

Finder File and Creation of Analytic Sample. URI provided a finder file with lists program participants and their enrollment dates, enabling us to use Medicaid and Medicare claims for these beneficiaries to calculate outcome measures.[142] As shown in Exhibit RIte.2, the finder file identified 341 unique patients, with a sample of 286 patients for the RIte program in the post-intervention period.

Exhibit RIte.2: Dually Eligible Beneficiaries Identified Through URI Finder File



Comparison Group. We use a comparison sample of dually eligible RI residents from Medicare FFS data available at the CMS Virtual Research Data Center (VRDC), pulling benchmarking information from 2012 RI Medicaid (Alpha-MAX) data. More recent RI data were not available. To ensure comparability between the two samples, we choose comparators who are similar on key characteristics, selecting patients who are an exact match on gender, age, race/ethnicity, index month, group home status, dual eligibility, and risk score.

[142] January 1, 2012, through December 31, 2014.

Analysis

Model. To answer our research question, we compare the entire pre-intervention period and post-intervention periods in a DID analysis. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{ Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{ Implementation} + \beta_4 \text{ Patient}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention—and estimate the average treatment effect for the two groups using combinations of β_1 (indicator for outcome in an Living RIte participant); β_2 (indicator for intervention implementation period); and β_3 (an interaction term enabling the estimation of the treatment effect during the post-implementation period).

Results

Descriptive Characteristics. Exhibit RIte.3 displays the descriptive characteristics of beneficiaries for the treatment and comparison groups after implementation of the intervention. We compare beneficiary experience occurring in the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical variable (age, race, ethnicity, coverage reason, discharge destination, and disease composition).

Exhibit RIte.3: Descriptive Characteristics for URI Living RIte Population and RI Medicare Comparators

Variable	URI	Comparison
Number of Persons	286	286
Gender % (N)		
Female	50.0 (143)	50.0 (143)
Age % (N)		
18-25 years	1.4 (4)	1.4 (4)
25-54 years	59.8 (171)	59.8 (171)
≥55 years	38.8 (111)	38.8 (111)
Race/Ethnicity % (N)		
White	95.5 (273)	95.5 (273)
Black	1.7 (5)	1.7 (5)
Hispanic	1.4 (4)	1.4 (4)
Other/Unknown	1.4 (4)	1.4 (4)
Dual Eligibility Status[1] % (N)		
Dually Eligible	100.0 (286)	100.0 (286)
Group Home Status[2] % (N)		
Group Home	52.4 (150)	52.4 (150)
Chronic Conditions[3]		
Mean CDPS Adult Disabled Risk Score (Standard Deviation)	1.76 (1.23)	1.83 (1.28)
Mean JEN Frailty (JFI) Score (SD)	4.51 (2.29)	4.51 (2.29)
Prevalence of Comorbidities % (N)		
IDD[4]	82.2 (235)	100.0 (286)
Asthma-COPD	17.5 (50)	16.4 (47)
CHF	4.2 (12)	3.8 (11)
Depression	42.0 (120)	46.2 (132)
Diabetes	18.2 (52)	19.6 (56)
Mean Utilization and Cost in Year Prior to Program Enrollment[5]		
All-cause Hospitalization Days[6]	1.25 (4.65)	1.47 (4.24)
Behavioral Health Hospitalization Days[7]	1.53 (20.89)	0.61 (4.22)
ED Visits per Patient[8]	0.82 (1.84)	1.01 (2.28)
Total Medicare Cost	$6,306 ($13,326)	$8,577 ($17,188)

[1] Dual eligibility was required for all cases and comparison participants. For those with an index month before January 2014, dual eligibility was determined by the monthly dual status indicator in the Medicare Part D data corresponding to their index month. For those with an index month of January 2014 or later, dual eligibility was determined by the monthly dual status indicator in the Medicare Part D data for December 2013. Dual eligibility required a dual status value of 02, 04, or 08.
[2] Group home status was determined through the observation of a reported procedure code (T2016, T2033) in the MAX data during January 2012, the most recent MAX data available.
[3] Chronic conditions and risk scores are annual measures and, with the exception of IDD, these measures were based on the reporting of diagnoses observed in the data during the calendar year prior to the index year.
[4] In order to maximize the identification of IDD, this measure was assessed in the calendar year prior to index and in the calendar year of index.
[5] All cases and comparisons were required to have at least one month of follow-up after their index month. Cases and controls were followed for twelve months after index unless they lost Medicare fee-for-service eligibility or the end of the data was reached in May 2015.
[6] Acute care hospital days paid by Medicare.
[7] Number of days in a Medicare-covered psychiatric hospital.
[8] Emergency department visits paid by Medicare.

DID Analysis. In Exhibit RIte.4 we present the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* implementation of the intervention. This model assesses the impact of the awardee's program across the entire post-implementation period.

The model-based estimates indicate the following about NCCS participants, relative to the comparison group:

- Utilization Measures: We observe non-significant decreases in all-cause hospitalization days, behavioral health hospitalization days, and ED visits.
- Cost: We observe a non-significant increase of $294 per patient for total Medicare cost.

Exhibit RIte.4: Difference-in-Differences Estimates for the Living RIte Program

Variable	DID Estimate [95% Confidence Interval]
Hospitalization Days per Month (per Beneficiary)	0.15 [-1.1, 1.4]
Behavioral Health Hospitalization Days (per Beneficiary)	-1.37 [-3.9, 1.2]
ED Visits (per Beneficiary)	0.03 [-0.43, 0.50]
Total Quarterly Medicare Cost per Beneficiary ($)	$294 [-$3,738, $4,327]

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Limitations and Next Steps. One limitation of this analysis is that we have only Medicare costs for comparators. Given the target population for the Living RIte program, Medicaid costs would be affected to a greater extent than Medicare costs but are not captured in this analysis. In future reports we will expand the follow-up period and add measures of quality of care to further explore the program's impact on participants.

Summary

Claims based analysis. Our quantitative analysis of the Living RIte program shows non-significant decreases in behavioral health hospitalization days. The program does not demonstrate decreases in total Medicare cost, all-cause hospitalization days, or ED visits. Due to the small number of patients enrolled in the Living RIte program for whom we could conduct this analysis, we are limited in our power to detect programmatic effects, so these results should be interpreted with caution.

Sustaining and Scaling the Living RIte Program. The Developmental Disability agencies provide case management for high-risk participants including those with I/DD through contracts with Rhode Island's Medicaid managed care vendor, Neighborhood Health Plan. There is a possibility that the ambulatory care clinics, which were equipped as part of the HCIA-supported pilot, could provide integrated medical care at a future time. The awardee has not reported plans to replicate or scale this program and has not received a no-cost extension of HCIA funding.

References

"Case No. Ca14-175." In *United States v State of Rhode Island*: United States District Court District of Rhode island, 2014

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by URI, 2015.

HCIA 11QR Quarterly Report for the University of Rhode Island, for Reporting Quarter End Date 3/31/2015. Submitted by URI, 2015.

HCIA Supplemental Document for University of Rhode Island, for Reporting Quarter End Date 9/30/2013. Submitted by URI, 2013.

HCIA Supplemental Document for University of Rhode Island, for Reporting Quarter End Date 3/31/2014. Submitted by URI, 2014.

HCIA Supplemental Document for University of Rhode Island, for Reporting Quarter End Date 9/30/2014. Submitted by URI, 2014.

HCIA Supplemental Document for University of Rhode Island, for Reporting Quarter End Date 12/31/2014. Submitted by URI, 2014.

HCIA Supplemental Document for the University of Rhode Island, for Reporting Quarter End Date 3/31/2015. Submitted by URI, 2015.

"Living RIte Driver Diagram." edited by URI-Living RIte. University of Rhode Island, 2013.

University of Texas Health Science Center at Houston

This chapter updates NORC's evaluation of the University of Texas Health Science Center at Houston's (UT Houston) High-Risk Children's Clinic (HRCC). The HRCC offers dedicated outpatient services (primary, specialty, post-acute, chronic disease management) and around-the-clock phone access for extremely fragile and complex chronically ill children enrolled in Medicaid (88 percent of participants). The goal of the HRCC is to deliver customized and comprehensive care to chronically ill children and their caregivers. HCIA funds have been used to support clinic staff, including primary and specialty care physicians and nurse practitioners, and a social worker.

We provide a brief update, based on the awardee's self-reported data to CMMI (for the time period January 1 through March 31, 2015), and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness using a Medicaid data set provided by the awardee.

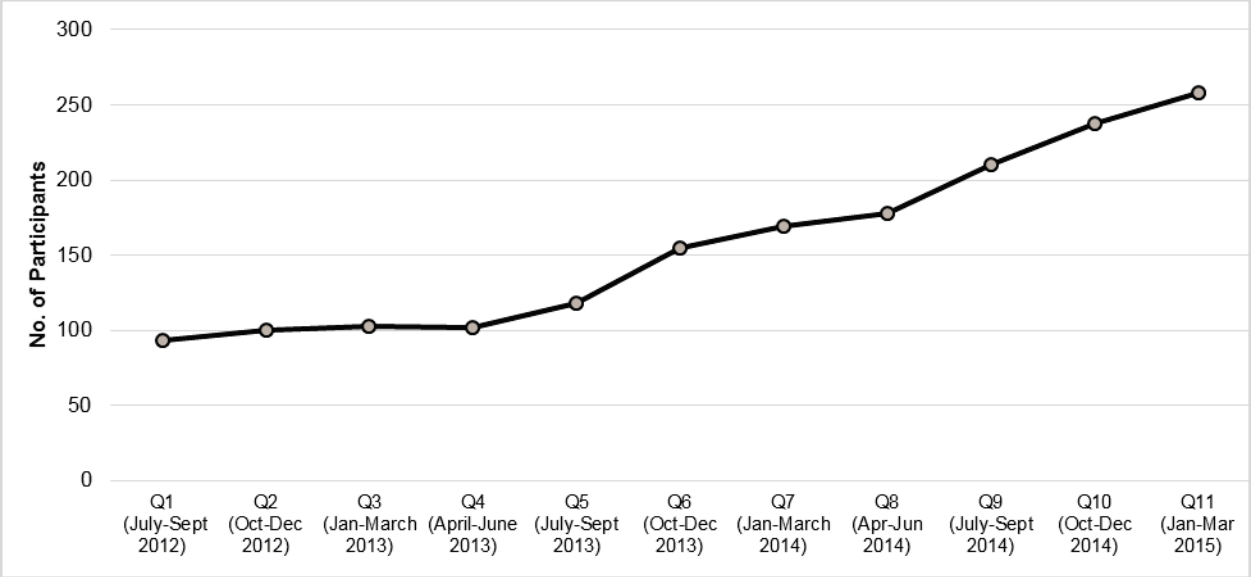
Overview of Awardee

CMMI Category for Awardee:	Academic/University
Funding Amount:	$3,701,370
Launch Date:	9/11/2012
State(s) Where Located:	Texas

Patients Targeted and Served

Self-reported data from UT Houston provides enrollment data by HCIA reporting quarter, as shown in Exhibit HRCC.1. The data show a slight steady increase over time. During the most recent quarter for which data are available (January 1 through March 31, 2015), HRCC served 258 participants. As of March 31, 2015, the program had served a cumulative total of 267 unique participants since program launch, 88 percent of the total number projected to be served over the three years of the HCIA-funded program (305 participants).

Exhibit HRCC.1: Total Number of HRCC Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: Most of participants are young children, ages one through 11 years (81 percent, or 210 children); four percent are infants under one year of age (10 participants), and 13 percent are adolescents ages 12-18 (334 participants).
- Gender: More participants are male (60 percent) than female.
- Racial and Ethnic Identity: Just under half (48 percent) of the participants are Hispanic/Latino, 40 percent are African American or Black, and 12 percent are White.

Update: Implementation Experience in Third Year of Award

Since NORC's site visit to HRCC (May 2014) and our first annual report (September 2014), UT Houston has continued to expand enrollment in and add clinical staff to the HRCC. The HRCC now has a fulltime pediatrician and three nurse practitioners, and subspecialist staffing in pulmonology, gastroenterology, pediatric neurology, adolescent medicine, infectious disease, allergy and immunology.

Notable updates in our understanding of the HRCC intervention are as follows:

Communications and Health IT. Communication and collaboration is key for the interdisciplinary team of pediatricians, nurse practitioners, and a social worker working closely together to deliver comprehensive care every day of the week. Similarly, sharing real-time data with Memorial Hermann Hospital is particularly important for this population so that HRCC can learn of and attend to ED visits and hospital admissions quickly. Hermann Memorial Hospital and the HRCC within the UT Medical School use different electronic health records systems (Care4 and AllScripts, respectively); the HRCC staff regularly access both EHRs.

Patient and Caregiver Engagement. Patient engagement centers on the UT Houston team's effort to educate and empower parents, other caregivers, and the patients themselves. The HRCC providers train and instill confidence in the parents to care for and understand their child's complex needs so that parents are better able to trust their own judgment and be more self-reliant. Every family in the HRCC has an assigned clinician who involves the parent in all health assessments, crediting the parent with the authoritative judgment as to whether something is amiss in their child's condition, even if standard test results and signs do not reveal a problem. HRCC providers educate families so they know how to look for certain exacerbating symptoms and encourage them to call the Clinic first, which can oftentimes prevent an emergency room visit. HRCC staff are bilingual (Spanish) and provide consultation to parents through educational visits, where HRCC staff will sit down with a family to discuss a child's condition and symptoms for two to three hours. The providers also frequently communicate with their patients' home health nurses and other care providers, welcoming them at patient visits, to ensure good communication among all care providers. This process serves to build caregiver confidence and eases the considerable burden of parental worries for their child's wellbeing.

As children mature, the HRCC providers involve the patients in their own care, encouraging them to understand their conditions and limitations, and encouraging them to adhere to medication regimens. For example, the physician who specializes in adolescent medicine motivates her older patients with asthma to use their preventive inhalers appropriately and discusses their care with them in terms that they can understand and to which they can relate.

UT Houston's own CAHPS results, as well as information gathered by NORC during a focus group with parents, indicate that patient and family caregiver engagement has been successful. CAHPS data show that 99% of parents agreed that the nurse practitioner and doctor addressed their questions and concerns and 99% agreed that the nurse practitioner/doctor spent enough time with them. During the May 2014 focus group, parents discussed the benefits of receiving education and support from the HRCC staff. One parent responding to a question about education received as part of the program, reported: "They [the HRCC staff] made us feel empowered! [We] Already know what they're going to tell us to do. So when we call [HRCC staff] it's more to get confirmation, affirmation that you're doing the right thing." Another parent remarked: "[An HRCC doctor] told me at the hospital 'You are the mom, you are the one that knows. Take care of my boy!' [I] feel like we're famous in the hospital now. If it's the regular floor (not PICU) then moms are in charge. [HRCC staff] want the other doctors to respect the mother's knowledge, telling us that 'Other doctors don't know him [the child], you know him.'"

Fidelity, Adaptability, and Self-Monitoring. As their patient population has grown, the HRCC has added part time staff and consultants to support identified patient needs, including: a nutritionist to aid the gastroenterologist in providing adequate diet and oral intake to fragile patients; a pediatric surgeon to help patients with severe necropsy, severe nutritional issues, and bowel anomalies; and an adolescent pediatrician to help older children transition to adult medicine. The social worker on staff also started to do home and school visits for patients to support and address contextual issues such as safe housing and school accommodations. HRCC leadership noted expansions of the HRCC clinic and additional patients do pose workload concerns, particularly in dealing with patient phone calls at nights. As new HRCC patients are added staff continue to discuss and monitor work load and make adjustments to as needed.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of analyses for Medicaid beneficiaries in the HRCC program and evaluate the effects of the program on measures of health care utilization and cost. The comparison group is Medicaid beneficiaries who were randomly assigned to the usual care arm of a randomized control trial (RCT) for this intervention prior to HCIA funding. We find that the HRCC program is associated with significantly lower rates of hospitalizations and emergency department visits, and significantly lower hospital and medical cost. When the cost of all Medicaid services are included in the analysis, average cost of care is lower for participants in the HRCC program than for those in the comparison group but the result is not statistically significant.

Measures. Findings are presented for three measures:

- Hospitalization rates per 1,000 beneficiaries
- ED visit rates per 1,000 beneficiaries
- Quarterly cost of care per beneficiary[143]

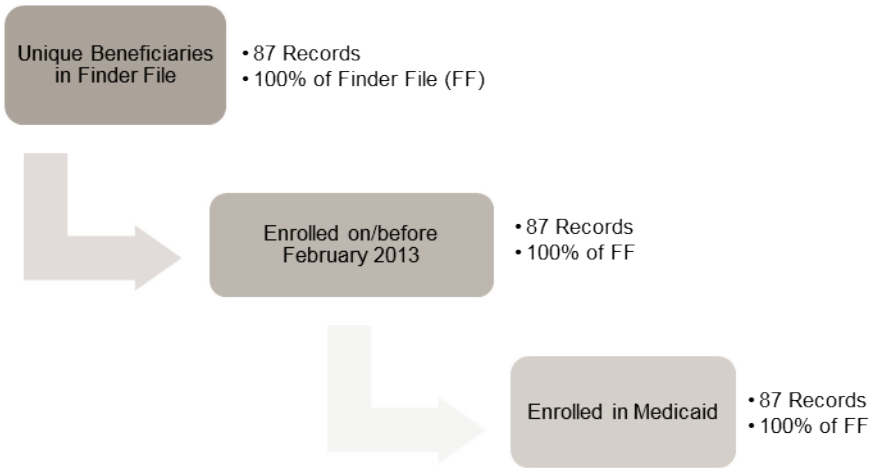
Research Questions. For each measure, what is the average difference in outcome between children served in the HRCC and children in the comparison (control) group, after adjusting for differences between the two populations?

Analytic Approach. We specify and employ a set of difference models, comparing the HRCC program with a comparison group of Medicaid participants randomly assigned to "usual care" in the post-intervention period. This analysis includes nine of every ten children served by the HRCC—those covered by Medicaid—and a comparison group with Medicaid coverage.

Finder File and Creation of Analytic Sample. UT Houston provided a finder file which lists enrollment dates for 87 Medicaid participants randomly assigned to the HRCC treatment group and 76 Medicaid participants randomly assigned to the usual care group. The awardee also provided a data set that includes Medicaid claims for all enrollees of their program that was obtained from Texas Medicaid Management Information System for the period January 2011 through February 2014. Program enrollment dates for the HRCC intervention range from March 4, 2011 through February 7, 2013. As shown in Exhibit HRCC.2, all 87 HRCC participants in the finder file were enrolled in Medicaid and included in the analytic file.

[143] We present two cost estimates, one calculated with all Medicaid services received by the participants and control group included, and the other in which only medical and hospital costs were included, in order to focus on the medical services component of Medicaid benefits that the HRCC addressed.

Exhibit HRCC.2: Medicaid Beneficiaries Identified Through UT Houston Finder File



Comparison Group. The comparison group consists of 76 participants who were enrolled in Medicaid and randomly assigned to the usual care group. Similar to the HRCC intervention group, an enrollment date was assigned to the comparison group members.

Analysis

Model. We specify and employ a logistic regression model with dichotomized measures of hospitalization and ED visits, comparing the experiences of participants in the HRCC program with those of a comparison group. For cost of care, we employ a GLM model, with a gamma distribution and log link. Cost of care is calculated both as total Medicaid cost and as the cost for medical and hospital services only. The latter analysis focuses specifically on the medical services targeted by the intervention and excludes the cost of ancillary services required by medically fragile children, such as home-based durable medical equipment, home nursing, and speech and physical therapy.

Results

Descriptive Characteristics. Exhibit HRCC.3 displays the descriptive characteristics for the HRCC and usual care groups after implementation of the intervention. We compare 87 HRCC participants to a comparison group of 76 participants with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (utilization in the year prior to the index date) and a chi-square test for categorical parameters (age, race, ethnicity, gender, risk stratum, maternal education, and managed care enrollment). Risk stratum is a variable provided by the awardee and represents the estimated baseline risk of hospitalization during the next year as judged by the HRCC physician director. Children judged to be at high (50-75 percent) or very high (76-100 percent) risk of hospitalization were eligible for random assignment to one of the two arms of the trial. Overall, HRCC participants and the comparison group are similar across all measures. However, there are slight, although not significant, differences in the proportion in each age category and in terms of race.

Exhibit HRCC.3: Descriptive Characteristics for the HRCC Program Enrollees and Comparison Group

Variable	UT Houston	
	High Risk Children's Clinic	Usual Care
Number of Beneficiaries	87	76
Mean (IQR) No. of Quarters Enrolled	10 (8-12)	10 (9-12)
Age % (N)		
0-12 months	31.0 (27)	22.4 (17)
13 months -2 years	13.8 (12)	23.7 (18)
3-5 years	24.1 (21)	23.7 (18)
6-11 years	24.1 (21)	19.7 (15)
12-15 years	6.9 (6)	10.5 (8)
Race/Ethnicity % (N)		
White	57.5 (50)	67.1 (51)
Black	42.5 (37)	32.9 (25)
Hispanic	52.9 (46)	55.3 (42)
Gender % (N)		
Female	39.1 (34)	42.1 (32)
Risk Stratum† % (N)		
High (50-75%)	87.4 (76)	89.5 (68)
Very High (76-100%)	12.6 (11)	10.5 (8)
Maternal Education % (N)		
High School Graduate	71.3 (62)	75.0 (57)
Not High School Graduate	28.7 (25)	25.0 (19)
Number of Families		
Unique No. of Families	78	75
Mean Utilization and Cost in Quarter Prior to Program Enrollment		
Hospitalizations per 1,000 (Standard Deviation)	513 (663)	508 (640
ED Visits per 1,000 (SD)	526 (871)	554 (1046)
Total Medicaid Cost (SD)	$11,382 ($23,576)	$9,770 ($22,754)
Any Managed Care Enrollment % (N)	40.2 (35)	38.2 (29)

NOTE: *p<0.10, **p<0.05, ***p<0.01. Statistical significance assessed using chi-square tests for proportions and t-tests for continuous variables comparing the two arms of the intervention.
†Risk strata are assigned by awardee and operationalized as the risk of hospitalization in the next year as determined by the physician. Categorical variables are listed as % (N) and the count and continuous variables are listed as mean (SD).

Difference Analysis. Results presented in Exhibit HRCC.4 represent the difference in average outcome between the HRCC intervention group and the comparison group after implementation of the intervention. This summative model assesses the impact of the HRCC program across the entire post-implementation period.[144]

The model-based estimates indicate the following about the HRCC program participants, relative to the comparison group:

- Utilization Measures: The HRCC program was associated with 52 fewer children per 1,000 with hospitalizations, and 100 fewer children per 1,000 with ED visits. In the small intervention

[144] Adjustment factors include age, gender, race/ethnicity, risk stratum, and education.

population, this corresponds to 5 and 9 fewer children with hospitalizations and ED visits, respectively. Both results are statistically significant.

- Cost: The HRCC program was associated with a statistically significant lower average quarterly cost of $1,452 per child for medical and hospital services. When all Medicaid services are included, the HRCC program was associated with a lower average quarterly cost per child of $1,022 that was not statistically significant.

Exhibit HRCC.4: Difference Estimates for the HRCC Program

Variable	Difference Estimate [95% Confidence Interval]
Hospitalizations (Likelihood per 1,000 Beneficiaries)	**-52 [-97, -7]****
ED Visits (Likelihood per 1,000 Beneficiaries)	**-100 [-151, -49]*****
Total Quarterly Cost of Care per Beneficiary ($)	-$1,022 [-$8,474, $6,429]
Total Quarterly Cost of Care per Beneficiary ($) excluding certain outpatient costs†	**-$1,452 [-$2,819, -$85] ****

NOTE: *p<0.10, **p<0.05, ***p<0.01. Models are adjusted for age, gender, race/ethnicity, risk stratum, and maternal education, and a hierarchical term was incorporated to account for family.

†This cost variable excludes certain outpatient services provided by school districts, level II Healthcare Common Procedure Coding System (HCPCS) codes, and Level 1 HCPCS codes related to home health, psychiatry, SNF, durable medical equipment, psychotherapy and speech/physical therapy, to focus on the medical services component of cost.

Limitations and Next Steps. This analysis has several limitations. The treatment population is very small (87 children) and includes only those children enrolled in the initial pilot study. The number of participants in the HRCC has since grown to 258, and may differ systematically from the initial group of participants. Currently the evaluation does not have access to a data set that would allow us to construct a comparison group from a pool of similarly complex and medically fragile children in Texas. We continue to explore possibilities for acquiring Medicaid data for a larger comparison group to expand our analysis to in future reports. We also expect to receive additional data from the awardee to evaluate the second phase of their program.

Summary

Claims-based Analysis. Our quantitative analysis of UT Houston's HRCC program shows significantly fewer hospitalizations and ED visits for enrolled children relative to the comparison group. The per-child quarterly cost of care for HRCC participants is lower than for the comparison group, a statistically significant result when only medical and hospital services are included in the analysis.

Sustaining and Scaling the High-Risk Children's Clinic. Memorial Hermann Hospital System and UT Medical School are partners for the HRCC intervention, with Memorial Hermann providing some institutional and financial support. As of June 2015, UT Houston received a 12-month no-cost extension of HCIA funding, and continues to enroll additional medically fragile children, both from the original control group for their pre-HCIA pilot and from Memorial Hermann Hospital services. In collaboration with the TX Medicaid MCO Amerigroup, the HRCC has received support through February 2016 from federally matched funds provided by the Texas Network Access Improvement Program (NAIP). HRCC leadership is currently seeking additional funding for 2016 through a proposal submitted to the TX

Department of Health and Human Services under NAIP in collaboration with three Medicaid HMO plans (Amerigroup, UnitedHealthcare, and Community Health Choice), which if approved will support the full operation of the high-risk children's clinic until August, 2016.

Since publication in JAMA in mid-2015 of the HRCC's internal evaluation findings, inquiries about the HRCC model from around the country have increased. HRCC leadership note that, to sustain the efforts of a dedicated comprehensive clinic for such medically fragile children, and to align financial incentives for their care in community settings, a unified Medicaid policy regarding coverage and payment for services should replace the multiple administrative and reimbursement arrangements that the HRCC now has with several TX MCOs, which impose great administrative burden and provide inconsistent financial support.

References

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by UT Houston, 2015.

HCIA 11QR Quarterly Report for the University of Texas Health Science Center at Houston, for Reporting Quarter End Date 3/31/2015. Submitted by UT Houston, 2015.

Mosquera RA, Avritscher EB, Samuels CL, Harris TS, Pedroza C, Evans P, Navarro F, Wootton SH, Pacheco S, Clifton G, Moody S, Franzini L, Zupancic J, Tyson JE. 2014. Effect of an enhanced medical home on serious illness and cost of care among high-risk children with chronic illness: a randomized clinical trial. *JAMA* 312 (24): 2640-8.

Vanderbilt University Medical Center

This chapter updates NORC's evaluation of the Vanderbilt University HCIA program, "Reducing Hospitalizations in Medicare Beneficiaries: A Collaboration between Acute and Post-Acute Care." The program aims to improve care and reduce re-hospitalizations for Medicare beneficiaries discharged from the Vanderbilt University Medical Center (VUMC) to one of 23 partner skilled nursing facilities (SNFs) in Tennessee and Kentucky. The program integrates in-hospital and post-acute care (PAC) services through use of the Improved Post-Acute Care Transitions (IMPACT) and Interventions to Reduce Acute Care Transfers (INTERACT) quality improvement and communications tools. The IMPACT intervention was developed to address issues of transitions of care from the hospital to PAC facilities. When a patient is admitted to VUMC, he/she is paired with a dedicated Transitions Advocate (TA—either an RN or LNP) who works with the patient during the hospital stay and through discharge to the SNF. While the patient is in the hospital, IMPACT staff prepare a Nursing Transition Summary (NuTS) that extracts key information from the patient medical record and nursing notes to present a succinct post-discharge care plan for the SNF staff, including a reconciled medication list and key action items that guide subsequent discussions between the TA and SNF staff. TAs screen patients in the hospital to determine if they have filled out a Physician Orders for Scope of Treatment (POST) form or made other advanced care planning/end-of-life care arrangements. If not, the patients are counseled by the TA to do so. If this process is not completed in the hospital, a note is made in the summary to continue conversations during the SNF stay. Once the patient is ready for discharge, the TA calls the SNF to go over any important issues highlighted in the NuTS form and medication list (the "warm hand-off"), and the TA also makes a 72-hour follow-up call with the SNF to answer any remaining questions. The INTERACT component is provided by the partner SNFs to both patients that were discharged from VUMC and patients that were referred to the SNF from other hospitals (and did not receive IMPACT). INTERACT consists of several structured tools and processes to improve skills and streamline communications among PAC staff.

We provide a brief update, based on the awardee's self-reported data to CMMI (eleventh quarterly report, for the time period January 1 through March 31, 2015) and on supplemental documents reviewed through August 1, 2015. Our focus is on results from NORC's claims-based analysis of program effectiveness.

Overview of Awardee

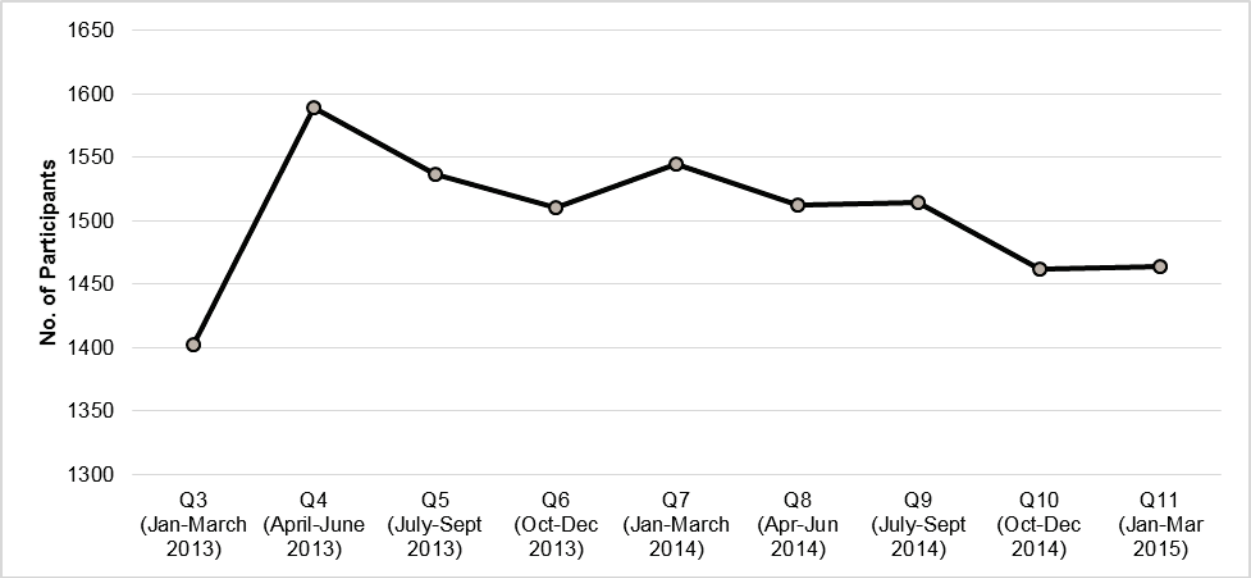
CMMI Category for Awardee:	Acute Care Hospital
Funding Amount:	$2,449,241
Launch Date:	1/17/13
State(s) Where Located:	Tennessee, Kentucky

Patients Targeted and Served

Self-reported data from VUMC provides enrollment data by HCIA quarter, as shown in Exhibit VUMC.1, for both direct participants (those whose services are funded by the HCIA grant) and those considered to be indirect participants (receiving services from staff trained under the HCIA grant but the services are not supported by the grant). Enrollment peaked in the second quarter after program launch and gradually decreased since then. During the most recent quarter for which data are available (January 1 through March 31, 2015), the program served 1,464 direct and indirect participants (164 were directly served,

while the remaining 1,300 are SNF patients counted as indirectly served). As of March 31, 2015, the program had served a cumulative total of 1,648 unique patients since program launch, comprising 92 percent of the total number projected to be served over the three years of the HCIA-funded program (1,800 participants).

Exhibit VUMC.1: Total Number of VUMC Participants, by HCIA Quarter



For the group of participants directly served during the period from January 1 through March 31, 2015:

- Age Cohort: About half of participants are over 75 years of age (57 percent), one-third are ages 65 to 74 years (35 percent), and eight percent are adults ages 26 to 64 years.
- Gender: 54 percent of participants are female.
- Racial and Ethnic Identity: Most participants are identified as White (83 percent), with a smaller proportion Black or African American (15 percent).

Update: Implementation Experience in Third Year of Award

VUMC continued to work with its 23 partner SNFs, providing enhanced discharge summaries and medication reconciliation in advance of patient transfers and conducting monthly quality reviews with SNF managers to review readmissions rates and discuss root causes of specific readmission cases. Many of the processes that the IMPACT team developed, the NuTS document and creating a single medications reconciliation record to replace multiple versions, were adapted for hospital-wide use. At the management level, the partner SNFs expressed their satisfaction with the INTERACT tools and richer communication with the VUMC Transition Advocates; however, project leadership at VUMC expressed some doubt that the new INTERACT processes and documentation and the NuTS were used effectively by SNF floor staff, in part because of the high turnover in nursing assistant positions. The awardee concluded its HCIA period of performance on June 30, 2015.

Communications and Health IT. VUMC introduced several new tools and processes for communication across settings of care: the NuTS, a new medication reconciliation form, and quality improvement reports shared between the SNFs and the hospital. Ensuring that information reaches the staff member or practitioner for whom it is actionable—for example, the NuTS form to the SNF floor nurse, the medication reconciliation form to the patient's primary care practitioner—remains a challenge. The small VUMC project team prepares these documents within a small time window prior to a SNF transfer, and sometimes they reach the SNF after the patient arrives.

The INTERACT component of the intervention includes monthly case reviews of readmissions to VUMC from the partnering SNFs. Both VUMC and SNF staff report that these joint quality reviews have increased their understanding of potentially preventable readmissions. SNF staff also report that the non-accusatory, collaborative fact-finding approach taken by the VUMC conveners of these review meetings helps to alleviate any misunderstandings or confusion.

Patient and Caregiver Engagement. Vanderbilt's IMPACT-INTERACT intervention is geared to engaging providers in coordinating care for patients transferred from VUMC to participating SNFs. The VUMC-based Transitions Advocates, RNs or NPs, endeavor to engage patients during rounds, including conducting screenings for pain, memory, and depression. The patient interviews help the TA and other IMPACT staff to complete the NuTS transfer report with information not available in patient charts.

The most significant patient engagement component involves discussions around advance care planning and directives. In addition to the screenings mentioned above, the TAs are also responsible for talking with each patient about Physician Order for Scope of Treatment (POST) preferences. Health care facilities such as hospitals and SNFs in Tennessee are required by law to complete the POST form upon transfer to another facility. The TA reviews what is currently in the POST form, including designations of power of attorney, do not resuscitate (DNR) status, and other care planning issues related to end-of-life care. If the patient doesn't have a POST form on file, the TA will talk with the patient about filling one out. NORC observed an advance directives discussion during its site visit to VUMC in the spring of 2015. The TA engaged the patient in a general conversation about their wishes for treatment in a case when the patient could not speak on their own behalf, and confirmed that a specific close relative had power of attorney. As the conversation progressed, the TA asked whether the patient still agreed with choices made previously and recorded on the POST. VUMC staff stated that advance care planning is an institutional priority. As the project staff involved in readmission reviews have examined root causes for readmission from a SNF, they reported that a substantial proportion of potentially unnecessary transfers from SNF to hospital resulted from family members insisting that the transfer be made, regardless of a patient's documented POST. Staff at partner SNFs acknowledged that there needs to be more time and educative effort spent with families of patients with advanced disease and poor prognosis about end-of-life care choices.

Fidelity, Adaptability, and Self-Monitoring. The SNF INTERACT intervention (documentation and communication tools and processes) has been adopted with some local adaptations by the facilities. Twenty-one of the 23 partner SNFs are part of National HealthCare Corporation, which has invested in INTERACT's introduction across their facilities more broadly. The other partners are a pair of locally sponsored SNFs that share a medical director who is faculty at VUMC. Over the course of implementing

INTERACT, the approach to training nursing staff evolved as nursing supervisors and trainers learned from early experience. At the outset of the program, training was formal, but once the project was underway in the facility, new staff were trained to use INTERACT tools as part of their general orientation to the facility's policies and practices. Further, the clinical leaders in the SNFs have some discretion to roll out the program at a pace that they see fit, as well as to tailor the program to fit their clinical operations and needs. One facility reported that while the leadership was trained on all the tools at once, they implemented components of the intervention (i.e. Stop and Watch, the NuTS tool, etc.) one at a time over the span of a couple of months. Another facility allowed its practitioners to use both older handwritten progress notes and the standardized INTERACT tools side-by-side until they were accustomed to INTERACT and the progress notes could be removed from operation.

The feature of VUMC's program that ties the hospital and SNFs together is their joint monthly review of hospital readmissions from each SNF and conducting a root-cause analysis of these cases. Self-monitoring is intrinsic to the program.

Program Effectiveness

NORC's evaluation analyzes claims and program data to answer most questions about intervention effectiveness related to the core outcome measures used with all awardees and supplemental measures specific to an individual awardee. We present results of difference-in-differences (DID) analyses for Medicare fee-for-service (FFS) beneficiary-episodes at VUMC's program from January 1, 2013, through September 30, 2014. We use a comparison group of FFS Medicare beneficiaries discharged from VUMC to SNFs that did not participate in the intervention. We find that the IMPACT-INTERACT program lowered emergency department visits and total cost of care within 90 days of hospital discharge; these results, however, did not reach statistical significance.

Measures. Findings are presented for six measures[145]:

- 90-day hospitalizations per 1,000 beneficiary-episodes
- 90-day emergency department (ED) visits per 1,000 beneficiary-episodes
- 30-day readmissions per 1,000 beneficiary-episodes
- 90-day total Medicare cost per beneficiary-episode
- 30-day practitioner visit (PV) follow-up per 1,000 beneficiary-episodes

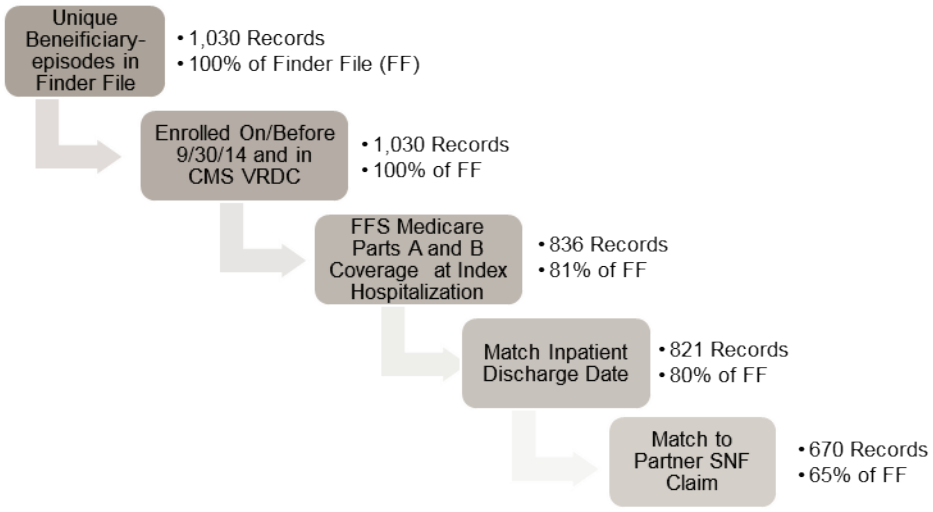
Research Question. For each measure, what is the difference in outcome between FFS Medicare beneficiary-episodes served by VUMC partner SNFs and beneficiary-episodes for VUMC patients discharged to non-partner SNFs, after implementation of the IMPACT-INTERACT program, adjusting for differences in outcomes at baseline and risk factors across both populations?

[145] We do not present results for practitioner follow-up visits within 7 days post-discharge, since beneficiary-episodes are discharged from VUMC to either partner or non-partner SNFs.

Analytic Approach. We specify and employ a DID model, comparing the changes in outcomes for FFS Medicare beneficiaries discharged from VUMC to participating SNFs with those for a comparison group between the pre- and post-intervention implementation periods.

Finder File and Creation of Analytic Sample. VUMC provided a finder file with program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[146] As shown in Exhibit VUMC.2, the finder file identified 1,030 unique beneficiary-episodes in the VUMC program. Beneficiary-episodes were further delimited by enrollment date, Medicare identifiers, admission date, discharge date, whether an inpatient claim (to better align with our comparison group, which is identified based on VUMC inpatient claims), and matched to a partner SNF claim, yielding a sample of 670 beneficiary-episodes in our final analytic sample.

Exhibit VUMC.2: FFS Medicare Beneficiary-Episodes Identified Through VUMC Finder File



Comparison Group. Our study design includes both a pre-intervention group comprised of episodes at VUMC discharged to partner SNFs, as well as an external comparison group comprised of episodes at VUMC discharged to non-partner SNFs during both the pre-intervention and post-intervention periods. Medicare claims for all beneficiaries discharged from VUMC who used services at one of the participating SNFs during the pre-intervention period (January 1, 2011, through December 31, 2012) constitute the pre-intervention treatment group, identified using claims-based rules. We also use Medicare claims to identify Medicare beneficiaries discharged from VUMC who received services at non-participating SNFs in the periods both before and after the intervention began. For more details on comparison group selection see Appendix C.

We use propensity score models to estimate the relative probability of a beneficiary-episode being discharged from VUMC to partner SNFs and obtained standardized mortality ratio (SMR) weights. For

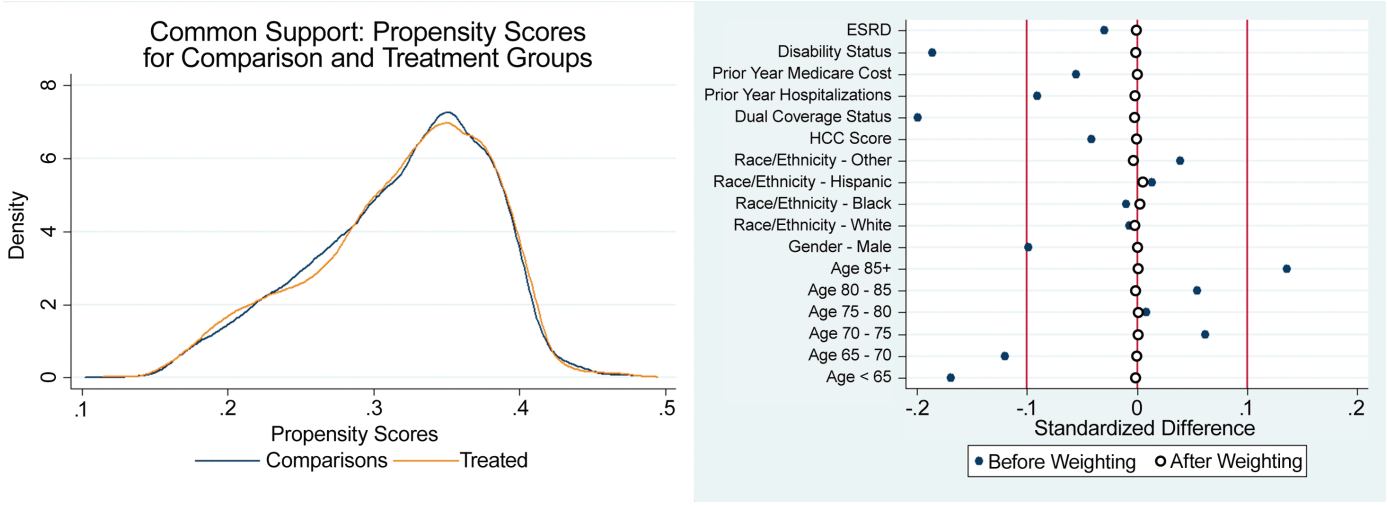
[146] We used Medicare claims through December 31, 2014, for the analysis in this report. We included beneficiary-episodes discharged on or before September 30, 2014 in our analyses, to allow for a beneficiary-episode length of 90-days.

more details on propensity score SMR weighting, please see Appendix C. We incorporate SMR weights into our analysis to minimize observed differences in beneficiary-episode characteristics between the VUMC treatment and comparison groups.

Exhibit VUMC.3 presents common support and balance in covariates for the treatment and comparison groups.

- We observe a high level of overlap in distribution of estimated propensity scores across VUMC treatment and comparison group beneficiary-episodes.
- The standardized difference between VUMC treatment and comparison group beneficiary-episodes across all covariates is negligible after incorporating SMR weights.

Exhibit VUMC.3: Test of Common Support and Covariate Balance



Analysis

Model. To answer the research question on program impact, we compare the change in outcomes between the treatment and comparison groups, across the entire post-intervention period (January 1, 2013, through September 30, 2014) and pre-intervention period (January 1, 2011 to December 31, 2012). We use generalized linear models (GLM) with binary outcome variables for utilization outcomes (e.g., did an individual have a hospitalization during this quarter?). For total cost of care, we used a GLM with a log link and gamma distribution. The model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 \text{Treatment}_{ij} + \beta_2 \text{Implementation} + \beta_3 \text{Treatment}_{ij} * \text{Implementation} + \beta_4 \text{ Beneficiary-Episode}_i + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre-intervention and post-intervention--and estimate the average treatment effect of the program during the post-implementation period (β_3), after adjusting for baseline differences between the intervention and comparison group (β_1), and accounting for time trends in the absence of the intervention (β_2).

Results

Descriptive Characteristics. Exhibit VUMC.4 displays the descriptive characteristics of beneficiary-episodes for the treatment and comparison groups before and after implementation of the intervention. We compare discharges occurring in the post-intervention period for the intervention and comparison groups with respect to demographics, comorbidities, and prior utilization. Differences between the groups are tested using a t-test for continuous measures (comorbidities and utilization before index hospitalization) and a chi-square test for categorical parameters (age, race, ethnicity, coverage reason, discharge destination, and disease composition). In the post-intervention period (January 1, 2013, through September 30, 2014), there were 670 beneficiary-episodes discharged from VUMC and attributed to participating SNFs (the VUMC treatment group) and 1,568 beneficiary-episodes discharged from VUMC and attributed to non-participating SNFs (the VUMC comparison group).

The VUMC treatment and comparison groups are not significantly different in gender, race, hierarchical condition category (HCC) score, or prior health care cost and hospitalizations. However, beneficiary-episodes in the VUMC treatment group represent patients who are older and less likely to be disabled than are those in the comparison group. Beneficiary-episodes for the VUMC treatment group have fewer comorbidities or chronic conditions. In addition, beneficiary-episodes for the VUMC treatment group have fewer ED visits during the year prior to their hospitalization at VUMC. In this report, we adjust for these observed differences in baseline covariates across treatment and comparison groups using propensity score SMR weighting, described earlier.

Exhibit VUMC.4: Descriptive Characteristics for the VUMC and Comparison Group Beneficiary-Episodes, Pre and Post Implementation

	Pre-Intervention		Post-Intervention	
	Treatment	Comparison	Treatment	Comparison
Number of Beneficiary Episodes	665	1,460	670	1,568
Age * % (N)**				
<65 years	14.1 (94)	19.5 (284)	11.6 (78)	18.7 (293)
65-69 years	8.6 (57)	14.6 (213)	13.1 (88)	15.1 (237)
70-74 years	20.3 (135)	16.3 (238)	15.7 (105)	15.1 (236)
75-79 years	17.4 (116)	16.1 (235)	16.1 (108)	16.8 (264)
80-84 years	15.8 (105)	15.8 (230)	20.7 (139)	16.6 (261)
≥ 85 years	23.8 (158)	17.8 (260)	22.7 (152)	17.7 (277)
Race/Ethnicity % (N)				
White	87.1 (579)	88.1 (1286)	87.3 (585)	86.8 (1361)
Black	10.4 (69)	10.8 (158)	11.3 (76)	11.5 (180)
Other	2.6 (17)	1.1 (16)	1.3 (9)	1.7 (27)
Gender % (N)				
Female	65.0 (432)	57.3 (836)	59.3 (397)	57.3 (898)
Hierarchical Condition Categories (HCC)				
Mean Count of HCCs (Standard Deviation) **	5 (3.5)	5.8 (3.4)	5.6 (3.4)	5.9 (3.5)
Mean HCC Score (SD)	3.5 (2.1)	3.5 (2.1)	3.4 (2.1)	3.6 (2.1)
Mean Utilization and Cost in Year Prior to Index Hospitalization				
Hospitalizations per 1,000 (SD)	1,410 (1,773)	1,686 (2,064)	1,488 (2,116)	1,577 (2,006)
ED Visits per 1,000 (SD) ***	1,422 (2,058)	1,999 (4,352)	1,282 (1,793)	1,833 (2,709)
Total Medicare Cost (SD)	$41,076 ($52,046)	$43,782 ($52,233)	$38,844 ($47,582)	$41,793 ($49,082)
Coverage Reason * % (N)**				
Age	74.4 (495)	64.6 (943)	73.3 (491)	65.1 (1020)
Disability	22.7 (151)	32.9 (481)	24.2 (162)	31.1 (487)
ESRD	0.6 (4)	0.7 (10)	0.7 (5)	1.8 (28)
Disability and ESRD	2.3 (15)	1.8 (26)	1.8 (12)	2.1 (33)
Discharges % (N)				
Home	3.9 (26)	4.5 (65)	4.8 (32)	4.3 (68)
SNF	91.6 (609)	84.1 (1228)	84.3 (565)	80.7 (1265)
HHA	0.2 (1)	0.4 (6)	0.6 (4)	0.3 (4)
Hospice	0.6 (4)	0.5 (8)	0.3 (2)	0.4 (7)
Other	3.8 (25)	10.5 (153)	10.0 (67)	14.3 (224)

NOTE: *p<0.10, **p<0.05, ***p<0.01.
The categorical variables are listed as % (n) and the count and continuous variables are listed as mean (SD). Statistical significance is assessed using chi-square tests for proportions and t-tests for continuous variables, comparing VUMC's treatment and comparison groups during the post-intervention implementation period.

DID Analysis. Results in Exhibit VUMC.5 represent the difference in average outcome between the awardee's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the intervention and comparison groups *before* implementation of the intervention. This model assesses the impact of VUMC's IMPACT-INTERACT program across the

entire post-implementation period. We also present sensitivity analyses assessing the impact of the VUMC's IMPACT-INTERACT program on utilization measures for episodes after SNF discharge.[147]

The model-based estimates indicate the following, relative to the comparison group:

- Utilization Measures: VUMC's IMPACT-INTERACT program is associated with lower 90-day ED visits (by 35 per 1000 episodes) and 30-day readmissions (by 4 per 1000 episodes), relative to the comparison group, although neither change is statistically significant. The IMPACT-INTERACT program is associated with a non-significant increase in 90-day hospitalizations.
- Cost: The IMPACT-INTERACT program is associated with a non-significant decrease in 90-day cost of care relative to the comparison group.
- Quality of Care Measures: Relative to the comparison group, 30-day practitioner visit (PV) follow-up is slightly and non-significantly higher for beneficiary-episodes in the IMPACT-INTERACT program.
- Utilization measures for beneficiary-episodes following discharge from SNF: After SNF discharge, the IMPACT-INTERACT program is associated with fewer 90-day ED visits (31 per 1000 episodes) but with more 30-day readmissions and 90-day hospitalizations, with none of these results statistically significant.

Exhibit VUMC.5: Difference-in-Differences Estimates for the VUMC Program

Variable	DID Estimate [95% Confidence Interval]
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	25 [-36, 86]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-35 [-98, 29]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	-4 [-58, 49]
90-Day Total Cost of Care per Beneficiary-Episode ($)	-$1,000 [-$3,671, $1,670]
30-Day PV Follow-up (Likelihood per 1,000 Beneficiary-Episodes)	-4 [-38, 30]
Utilization After SNF Discharge	
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary-Episodes)	24 [-41, 89]
90-Day ED Visits (Likelihood per 1,000 Beneficiary-Episodes)	-31 [-97, 34]
30-Day Readmissions (Likelihood per 1,000 Beneficiary-Episodes)	4 [-70, 79]

Limitations and Next Steps. This analysis is limited to the first seven quarters of the awardee's 12-quarter implementation period. In future reports we will continue to examine whether the program becomes cost-saving as observations are added with subsequent quarters of experience, and whether the program shows a reduction in other core utilization measures.

Summary

Claims-based Analysis. Our quantitative analyses of VUMC's IMPACT-INTERACT program show lower 90-day ED visits and 90-day cost of care for its beneficiary-episodes, relative to a comparison group, that are not statistically significant. Other measures of utilization and quality are worse for the

[147] Adjustment factors include age, gender, race/ethnicity, dual eligibility, hospital episode length, HCC score, discharge disposition, and original coverage reason.

intervention group relative to their comparators but were not statistically significant either. In subsequent analyses, we will couple our quantitative findings with a more thorough understanding from our qualitative data of the key factors related to implementation to draw conclusions about the impact of the awardee program on health, quality of care, utilization and cost.

Sustaining and Scaling IMPACT and INTERACT. Although the IMPACT intervention as staffed and conducted under HCIA will not continue intact, the IMPACT intervention has resulted in several institution-wide reforms. VUMC leadership established a Transitions Management Office, with the mission of coordinating the activities of all PAC initiatives underway at the Medical Center and determine which will be picked up for in-house funding. This office plans to sustain a modified version of IMPACT's revised discharge documents, using a new "transfer wizard" discharge platform (within the VUMC EHR). This includes part of the medication reconciliation form and a PAC transfer tool built on the Nursing Transition Summary form). VUMC's Readmission Collaborative is a vehicle for promoting this innovation model (assessment tool, case review process) for use with other patients, beyond those who are discharged to a SNF.

The National HealthCare Corporation, VUMC's SNF partner, is considering expanding aspects of the INTERACT intervention to its assisted living and independent living residences.

References

HCIA 11QR Narrative Progress Report, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA 11QR Quarterly Report for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #1 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #2 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #3 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #4 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #5 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.

HCIA Supplemental Report #6 for Vanderbilt University Medical Center, for Reporting Quarter End Date 3/31/2015. Submitted by VUMC, 2015.