THIRD ANNUAL REPORT

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

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Table of Contents

List of Exhibits

Executive Summary

Overview, Evaluation of Complex/High-Risk Patient Targeting Awardees

This is the third 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 multiple chronic conditions (MCC) 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 innovations to improve the quality of care and health while lowering overall health care cost. (See Exhibit ES.1 for a list of awardees and HCIA-supported innovations, with corresponding funding amounts.) Four of the awardees are implementing innovations that have two or more distinct programs or arms, each of which is assessed separately. These awardees include J-CHiP (post-acute care or hospital-based arm and ambulatory care community arm), PPMC (NORC's evaluation considers the six arms for which adequate claims data are available), St. Francis (post-acute care or hospital-based arm and ambulatory care community arm), and U North Texas (implementation in skilled nursing facilities, assisted living/memory care residences, and independent living residences).

Key outcomes of interest (e.g., core measures) include total cost of care, utilization (all-cause hospital admissions, emergency department visits, hospital readmissions), quality of care (e.g., ambulatory care-sensitive hospitalizations, practitioner follow-up visits post-hospital discharge, potentially avoidable hospitalizations), and patient health and well-being. The evaluation utilizes a mixed-methods approach, using a case-study design where each award comprises a case; Exhibit ES.2 depicts our evaluation conceptual framework. Data sources include Medicare and Medicaid claims, workforce trainee surveys and surveys of beneficiary and caregiver experience, program documents and awardee reports to CMMI, and primary data collected through awardee interviews and site visits.

We present program effectiveness findings for the 23 CHRPT awardees, based on claims, survey, and qualitative data, highlighting the nine awardees that have achieved cost savings or improved utilization and/or quality of care without significantly increasing the total cost of care. All claims-based findings presented are from difference-in-differences models, comparing the experiences of enrolled beneficiaries with those of a matched comparison group. Our study design reports claims-based outcomes in terms of beneficiary-episodes for innovations that address post-acute care (hospital evaluation design) and beneficiaries for innovations that address ambulatory care (community evaluation design). While findings are described in terms of impact on measures, our assessment judgments are about association rather than causation. In addition to findings about program effectiveness, we include an analysis of themes across pairs and groups of awardee interventions, identifying emerging best practices for serving medically complex populations, for workforce development, and for sustaining, replicating, and scaling innovation.

Exhibit ES.1: Health Care Innovation Awardees, Complex/High-Risk Patient Targeting

Awardee	Funding Amount	Intervention	State(s)
Beth Israel Deaconess Medical Center (BIDMC)	$4,937,189	Post-Acute Care Transitions	MA
California Long-Term Care Education Center (CLTCEC)	$11,831,443	Care Team Integration of the Home-Based Workforce	CA
Community Care of North Carolina (CCNC)	$9,327,422	Child Health Accountable Care Collaborative	NC
Courage Kenny Rehabilitation Institute (CKRI)	$1,767,667	Advanced Primary Care Clinic	MN
Developmental Disabilities Health Services (DDHS)	$3,701,525	Developmental Disabilities Health Home	NJ, NY
Johns Hopkins University (J-CHiP)	$19,920,338	Community Health Partnership	MD
Johns Hopkins University School of Nursing (JHU SON)	$4,075,344	Project Community Aging in Place, Advancing Better Living for Elders	MD
LifeLong Medical Care (LifeLong)	$1,109,229	LifeLong Comprehensive Care Initiative	CA
Northland Healthcare Alliance (Northland)	$2,726,216	Northland Care Coordination for Seniors	ND
Palliative Care Consultants of Santa Barbara (PCCSB)	$4,253,215	Doctors Assisting Seniors at Home	CA
Pittsburgh Regional Health Initiative (PRHI)	$10,412,359	Primary Care Resource Centers	PA, WV
Providence Portland Medical Center (PPMC)	$17,337,094	Tri-County Health Commons	OR
South Carolina Research Foundation (SCRF)	$2,884,719	HOMECARE+	SC
St. Francis Healthcare Foundation of Hawaii (St. Francis)	$5,299,706	Home Outreach Program and E-Health (H.O.P.E.)	HI
Sutter Health Corporation (Sutter Health)	$13,000,000	Advanced Illness Management	CA
University Emergency Medical Services (UEMS)	$2,562,937	Better Health through Social and Health Care Linkages Beyond the Emergency Department	NY
University of Arkansas for Medical Sciences (UAMS)	$3,518,798	Cost-Effective Delivery of Enhanced Home Caregiver Training	AR, CA, HI, TX
University of Iowa Hospitals and Clinics (U Iowa)	$7,662,278	Transitional Care Teams	IA
University of New Mexico Health Sciences Center (U New Mexico)	$8,401,614	Extension for Community Healthcare Outcomes (ECHO) Care	NM
University of North Texas Health Science Center (U North Texas)	$7,329,714	Brookdale Senior Living Transitions of Care	CO, FL, KS, TN, TX
University of Rhode Island (URI)	$10,202,795	Living RIte Centers	RI
University of Texas Health Sciences Center (UT Houston)	$3,701,370	High-Risk Children's Clinic	TX
Vanderbilt University Medical Center (VUMC)	$2,449,241	Reducing Hospitalizations in Medicare Beneficiaries	KY, TN

Exhibit ES.2: Conceptual Framework, Evaluation of the CHRPT Portfolio of HCIA Awardees

Outcomes & Program Effectiveness

NORC's evaluation considers a range of program effectiveness outcomes (e.g., cost, utilization, quality of care, beneficiary health, functioning, and wellbeing). The summative findings draw primarily upon Medicare and Medicaid claims-based estimates of impact, related to the total cost of care, utilization, and quality of care for each awardee's innovation, as well as observations across pairs and groups of awardees. The total cost of care estimates are based on data from Medicare and Medicaid claims only and do not include the cost of the intervention. In addition, findings from surveys and qualitative data enhance our understanding of quality of care. Success for an awardee's innovation or intervention arm reflects savings in the total cost of care that achieve statistical significance, strengthened when accompanied by one or more improvements in utilization and/or the quality of care. Conversely, program effectiveness is also indicated by improved utilization and/or quality of care where there is no statistically significant increase in the total cost of care.

Cost of Care (Claims-based Findings)

Total Cost of Care per Awardee. Among the 20 awardees for whom claims cost data is available, ten demonstrate statistically significant cost savings, relative to a comparison group, for at least one program or arm of their interventions.[1] Average quarterly cost savings range from -$381 (PPMC, ED Guides) to -$5,657 (Sutter Health) per beneficiary. See Exhibit ES.3 for a summary table of findings for the total cost of care, based on Medicare or Medicaid data as noted, and Exhibit ES.4 for a visual depiction of estimated cost savings and losses that reach statistical significance, with 90 percent confidence intervals for each estimate. Thirteen intervention or intervention arms have average quarterly cost savings of no more than approximately -$2,000 per beneficiary (for ambulatory care or community innovation arm) or beneficiary-episode (for post-acute care or hospital innovation arm). One awardee (CLTCEC) has both cost savings and losses, depending on the length of enrollment included in the analysis, and one awardee (URI) shows statistically significant average quarterly losses of $2,360 per beneficiary.

Aggregate Cost Savings or Loss per Awardee. Another way to consider impact is to assess the scale of innovation, by estimating aggregate cost savings or loss that include the number of beneficiaries served, the mean number of calendar quarters over which beneficiaries are enrolled, and the average quarterly impact on total cost of care. See Exhibit ES.3 for a summary table that displays these aggregate estimates and Exhibit ES.5 for a visual depiction of aggregate savings and losses. Considering the scope of an awardee's innovation gives us another way to gauge impact, as there are many smaller scale innovations within the complex/high-risk portfolio whose impact is likely to be more modest than that of innovations piloted by health care systems or corporations, whose interventions have the potential to touch thousands or tens of thousands of beneficiaries. As above, there are interventions or intervention arms with aggregate savings in the total cost of care, ranging from -$281,791 (PPMC, New Directions) to -$68,541,307 (J-CHiP hospital arm, Medicaid). Twelve have aggregate cost savings of under -$10 million, two (Sutter Health; J-CHiP community arm, Medicaid) have cost savings between -$15 million and -$25 million, and J-CHiP's hospital arm has the largest estimated cost savings, in both Medicare and Medicaid dollars. Shaded cells indicate areas where no data are available.

[1] Claims data on cost are not available for CCNC, LifeLong, and UAMS.

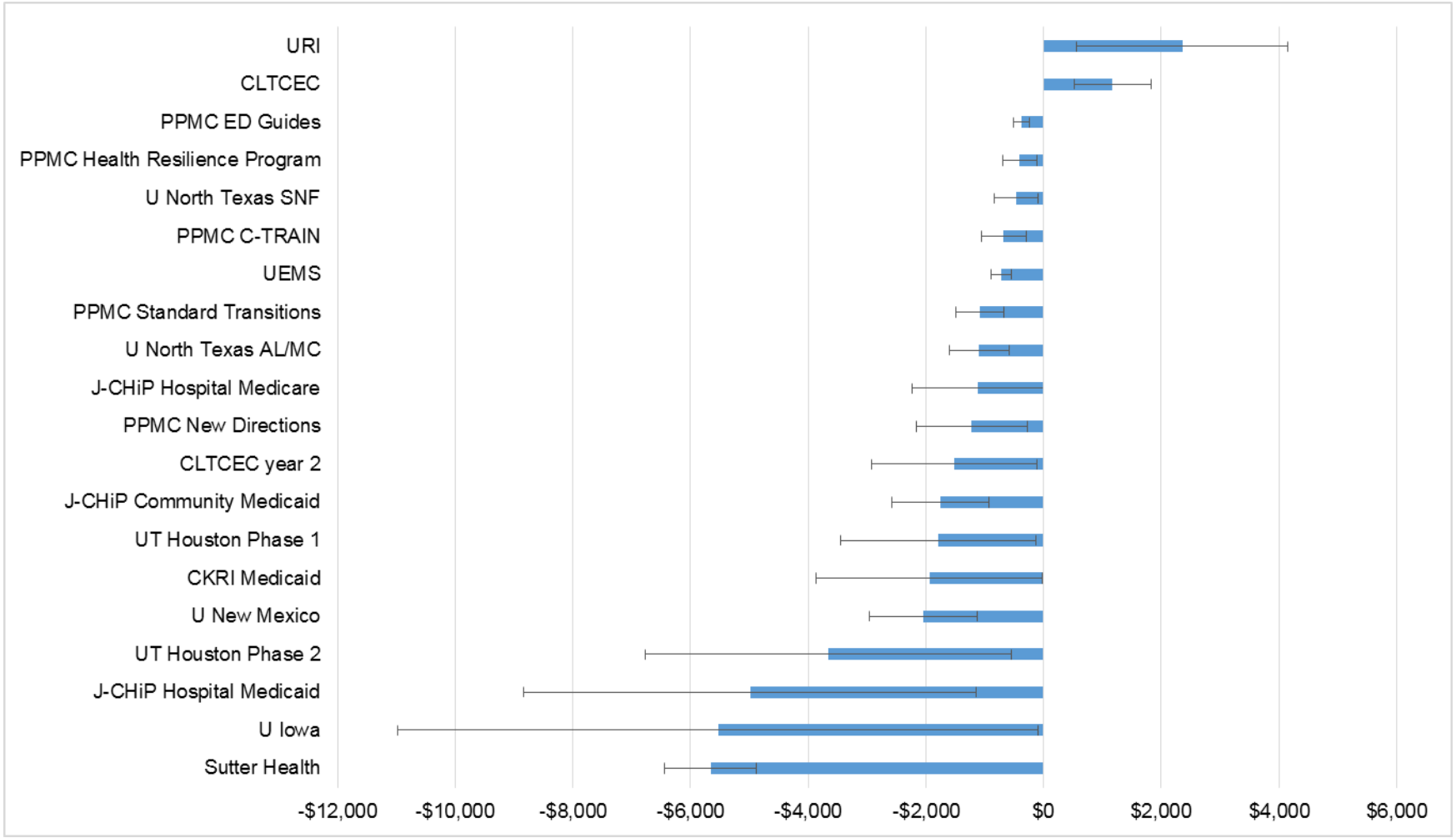
Exhibit ES.3: Cost Effects Associated with HCIA One Interventions, by Awardee

Awardee	Program Model	Evaluation Design§§§§	Data		Average Quarterly Cost§		Aggregate Impact		
			Medicare	Medicaid	Estimate	90% Confidence Interval	Number Enrolled	Mean Quarters of Enrollment§§	Total Cost of Care
BIDMC	Transitional Care	H	■		$825	[-$958, $2,608]	4,038	11.0	$3,332,850
CLTCEC	Train Home Care Workers (entire period of performance)	C	■		**$1,175 *** **	[$515, $1,835]	1,020	3.6	**$4,301,627*****
	2nd year only				**-$1,522 ***	[-$2,931, -$113]	268	2.6	**-$960,610***
CKRI	Integrated Care Delivery	C	■		-$468	[-$2,585, $1,649]	66	7.1	-$189,202
				■	**-$1,943 ***	**[-$3,862, -$24]**	136	7.1	**-$1,696,476***
DDHS	Disability Medical Home	C	■		$320	[-$190, $830	349	6.7	$738,047
				■	$1,982	[-$4,303, $8,267]	104	3.9	$693,719
J-CHiP	Transitional Care, Care Coordination	H	■		**-$1,115 ***	**[-$2,236, $0]**	26,114	8.0	**-$29,153,336***
				■	**-$4,987 *****	**[-$6,909, -$3,065]**	13,745	8.0	**-$68,541,307*****
	Care Coordination	C	■		-$495	[-$1,109, $119]	2,126	9.0	-$4,872,064
				■	**-$1,756 *****	**[-$2,584, -$928]**	2,511	8.0	**-$24,715,159*****
JHU SON	Home Care	C	■		$93	[-$1,076, $1,262]	172	7.2	$108,576
				■	$403	[-$443, $1,249]	207	7.5	$565,688
LifeLong	Care Coordination, Independent Living Skills	C		■			225		
Northland	Care Coordination	C	■		$148	[-$365, $661]	562	5.2	$433,853
PCCSB	ED Diversion, ACP	C	■		-$316	[-$745, $113]	1,112	5.5	-$1,920,663
PRHI	Transitional Care (90-day)	H	■		-$24	[-$1,385, $1,337]	5,158	9.0	-$122,108
	Transitional Care (180-day)		■		-$1,732	[-$3,898, $434]	5,158	9.0	-$8,931,162
PPMC	Health Resilience Program	C		■	**-$408 ** **	**[-$700, -$115]**	607	2.4	**-$600,854****
	New Directions			■	**-$1,220 ** **	**[-$2,164, -$276]**	98	2.4	**-$281,791****
	ED Guides (ED Diversion)			■	**-$381 *****	**[-$516, -$246]**	1,503	2.2	**-$1,273,740*****
	Standard Transitions			■	**-$1,081 *****	**[-$1,495, -$667]**	309	1.7	**-$578,241*****
	C-TRAIN			■	**-$681 *****	**[-$1,061, -$302]**	226	2.0	**-$305,968*****
St. Francis	Transitional Care, Telemonitoring	H	■		$805	[-$5,651, $7,261]	145	11	$116,725
	Telemonitoring	C	■		-$861	[-$2,239, $517]	252	3.7	-$793,601

Awardee	Program Model	Evaluation Design§§§§	Data		Average Quarterly Cost§		Aggregate Impact		
			Medicare	Medicaid	Estimate	90% Confidence Interval	Number Enrolled	Mean Quarters of Enrollment§§	Total Cost of Care
SCRF	Home Care	C	■		$129	[-$894, $1,152]	172	5.6	$118,249
Sutter Health§§§§§	Transitional Care, ACP	C (EOL)	■		**-$5,657 *** **	**[-$6,440, -$4,874]**	3,339		**-$18,888,723*** **
UEMS	ED Diversion	C		■	**-$717 *** **	**[-$883, -$550]**	839	4.4	**-$2,647,775*** **
U Iowa	Transitional Care	H	■		**-$5,533 * **	**[-$10,968, -$98]**	380	8.0	**-$2,102,365* **
U New Mexico	Integrated Care	C		■	**-$2,044 *** **	**[-$2,968, -$1,120]**	553	5.0	**-$4,889,750*** **
U North Texas	Transitional Care (30-day)	H (SNF)	■		**-$449 ** **	**[-$817, -$81]**	6,828	10.0	**-$3,067,186** **
	Transitional Care (90-day)		■		-$567	[-$1,293, $159]	6,828	10.0	-$3,873,804
	Care Coordination	C (AL/MC)	■		**-$1,095 *** **	**[-$1,603, -$587]**	1,473	11.0	**-$5,419,635*** **
URI	Disability Medical Home	C	■		**$2,360 ** **	**[$566, $4,154]**	305	10.0	**$6,136,229** **
UT Houston§§§	Phase 1 of Intervention	C		■	**-$1,790 * **	**[-$3,445, -$135]**			
	Phase 2 of Intervention			■	**-$3,649 * **	**[-$6,755, -$543]**			
VUMC	Transitional Care	H (SNF)	■		$29	[-$1,486, $1,544]	877	10.0	$24,183

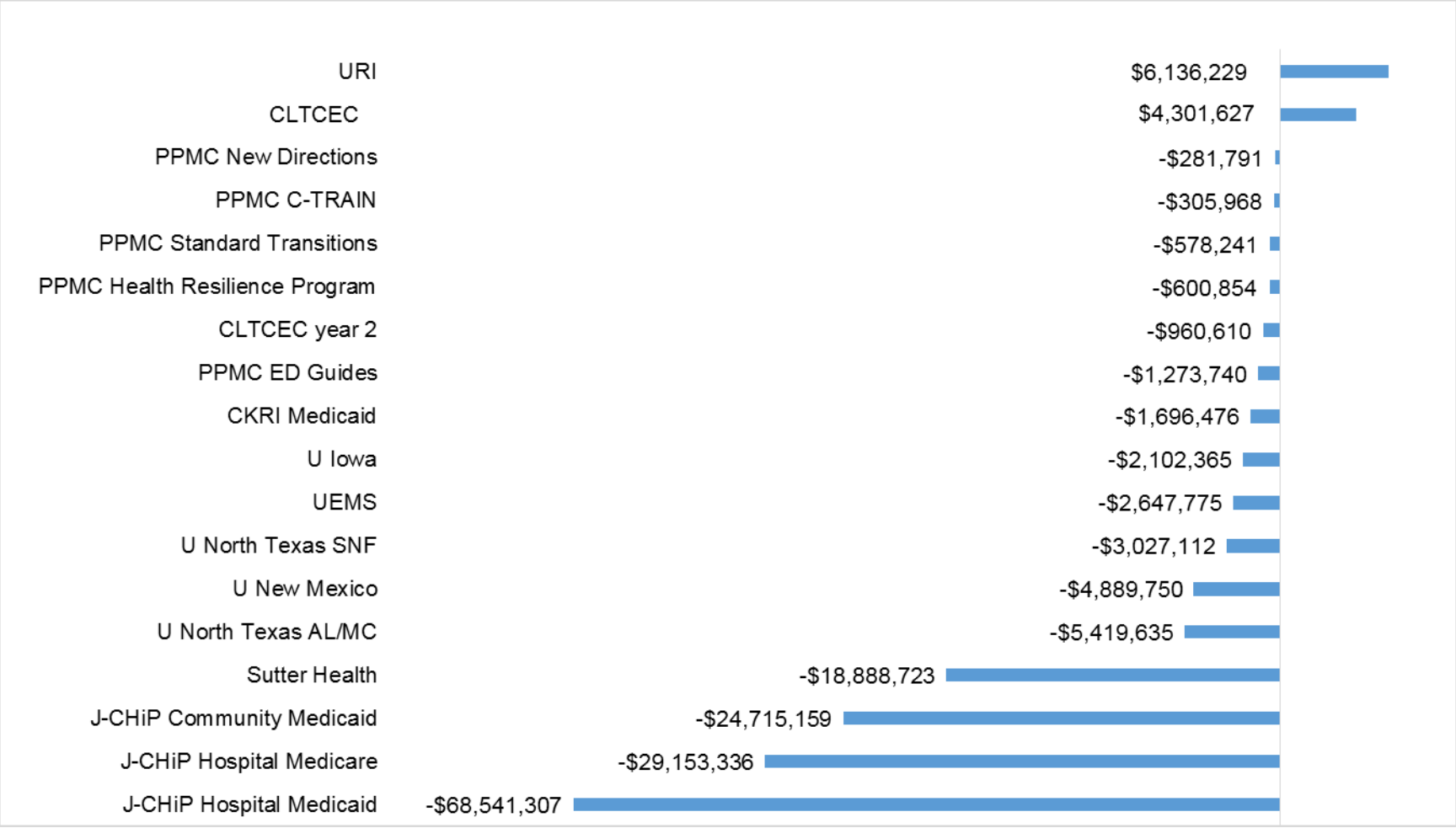
NOTES: *p<0.10, **p<0.05, ***p<0.010. **BOLD font** indicates statistical significance at p<0.10 level. Shaded cells indicate areas where no data are available. AL/MC = assisted living/memory care, ED = emergency department, EOL = end of life, SNF = skilled nursing facilities. §Units are per beneficiary-episode for hospital design and per beneficiary for community design. §§Calculation of mean length of enrollment is based on finder files that may extend beyond June 20, 2015, for selected awardees with a no-cost extension; the estimated total cost of care is based on analysis of claims for a period that may extend beyond June 30, 2015. §§§ Cost of care measure for UT Houston is for selected costs of care (outpatient clinic and hospital), reflecting scope of potential impact of intervention, rather than total cost of care. §§§§ Evaluation Designs include Hospital (H) and Community (C). §§§§§ Primary analysis for Sutter Health is for beneficiaries in the last 30 days of life and is a differences (time-series) rather than DID analysis; our DID analysis of the experiences of all beneficiaries over the full performance period does not reliably model the intervention's impacts, due to the inability to construct a comparison group with similar life trajectories, and is included in Appendix D.

Exhibit ES.4: Average Quarterly Total Cost of Care, by Awardee



NOTES: Average quarterly total cost of care (savings or loss) are in dollars per beneficiary-episode (hospital evaluation design) or per beneficiary (community evaluation design). Bars indicate average quarterly cost (statistically significant at the p<0.10 level) and black lines represent 90 percent confidence intervals around each estimate for total cost; 90 percent confidence interval may cross zero and still reach statistical significance.

Exhibit ES.5: Aggregate Total Cost of Care, by Awardee



NOTES: Aggregate cost savings for J-CHiP Hospital Medicare not shown to scale, to allow visualization of full range of estimates. Aggregate cost savings are not presented for UT Houston due to methodological limits of analysis.

Health Services Utilization and Quality of Care (Claims-based Findings)

Exhibit ES.6 displays summary findings for claims-based estimates of hospitalizations, emergency department (ED) visits, hospital readmissions, and measures of quality of care, based on Medicare or Medicaid claims data as noted.

Hospitalizations. Among eight of 21 awardees for whom claims data are available, there are statistically significant decreases in hospitalizations for at least one intervention arm, with average quarterly impacts ranging from -15 to -148 hospitalizations per 1,000 beneficiaries. One awardee (J-CHiP) has both an increase (hospital arm) and decrease (community arm) in hospitalizations; all changes are statistically significant.

Emergency Department (ED) Visits. Ten awardees show significant decreases in ED visits for at least one intervention arm, with average quarterly impacts ranging from -16 (J-CHiP community, Medicare) to -162 (PPMC, New Directions arm) ED visits per 1,000 beneficiaries. Three interventions have an increase in ED visits per quarter: Northland (23 per 1,000 beneficiaries), Sutter Health (28 per 1,000 beneficiaries), and PPMC's ED Guides Program (60 per 1,000 beneficiaries) and Standard Transitions Program (154 per 1,000 beneficiaries).

Readmissions. Of the 14 awardees for whom 30-day hospital readmissions may be measured, two show decreases: J-CHiP community arm (Medicaid analysis) (-36 per 1,000 beneficiaries) and U North Texas's assisted living/memory care arm (-336 per 1,000 beneficiaries). Two awardees show increases in 30-day readmissions: J-CHiP's hospital arm (14 per 1,000 beneficiary-episodes; Medicare analysis) and SCRF (112 per 1,000 beneficiaries).

Quality of Care.

Ambulatory Care-Sensitive (ACS) Hospitalizations. One awardee (U North Texas, assisted living/memory care arm) shows a quarterly decrease of -6 per 1,000 beneficiaries.

Practitioner Follow-Up Visits. With respect to this measure of access to care, four interventions show increases in practitioner follow-up post-discharge from an acute care hospital. PRHI has an increase in 7-day follow-up visits per quarter (68 per 1,000 beneficiary-episodes). Increases in 30-day follow-up visits are demonstrated for BIDMC (23 per 1,000 beneficiary-episodes), PRHI (33 per 1,000 beneficiary-episodes), VUMC (58 per 1,000 beneficiary-episodes), and U Iowa (85 per 1,000 beneficiary-episodes).

Quality of Care (Survey and Qualitative Findings)

Survey and qualitative data from site visits (focus groups, group discussions, direct observations) and interviews are analyzed to characterize the impact of HCIA-supported innovations on timeliness of services delivery, beneficiary experience and satisfaction, patient safety, and the experience of informal (family, unpaid) caregivers. Findings across these four aspects of program effectiveness vary from awardee to awardee, reflecting the feasibility of survey work (e.g., sample of adequate size and representativeness, the existence and quality of an awardee's own surveys), the availability of

beneficiaries and caregivers to participate in focus groups and interviews, and the degree of transparency of a specific innovation program model or practice to beneficiaries and their caregivers (e.g., for BIDMC, VUMC, and U North Texas SNF and AL arms, the innovations are designed to be integrated into clinical or organizational operating practices and ideally, invisible to patients and families).

Timeliness of Services Delivery. Where awardees offer extended hours of telephone access to providers at night and on weekends (PCCSB, Sutter Health, UT Houston) or conduct home or telephone visits post-discharge (UEMS, U Iowa), they receive high marks for improving timeliness of care and access. Facilitation of access to services through coordination with medical transportation (CKRI, UEMS) is also described as key to improved timeliness.

Beneficiary Experience and Satisfaction. High levels of satisfaction are reported across the portfolio, particularly for awardees' efforts to improve communication and sharing of data among providers and health care systems and between providers and patients. Awardees that have emphasized trust-building with beneficiaries, for example, those with behavioral health or substance abuse diagnoses that make them particularly hard to reach (J-CHiP, PPMC, U New Mexico),and those that emphasize independent living skills and empowerment for persons living with disability (DDHS, LifeLong, URI) or the adaptation of homes to enable beneficiaries to remain independent in their communities (JHU SON, Northland), are often credited by enrolled beneficiaries as particularly meaningful.

Patient Safety. Quality assurance innovations to improve transitions of care post-discharge (the INTERACT suite of tools implemented by U North Texas and VUMC) are credited by intervention staff with improving the safety of clinical encounters and residential care. Another aspect of improvement in patient safety for medically complex beneficiaries is seen in program models that include medication reconciliation as part of care coordination (PCCSB, Sutter Health) or care delivery that includes a clinical pharmacist as a team member (BIDMC, PRHI, URI).

Informal Caregiver Experience. Seven awardees (CCNC, DDHS, Northland, PCCSB, Sutter Health, UT Houston, U North Texas) include intervention components designed specifically to offer education and support to unpaid or family (informal) caregivers for persons living with MCC, in conjunction with services delivery to medically complex beneficiaries. In addition, the three awards that have implemented training programs for personal care aides (CLTCEC, SCRF, UAMS) also target informal caregivers; about one quarter of UAMS trainees are the primary caregiver for a household member. Caregivers credit the HCIA-supported interventions for boosting their self-confidence as caregivers, providing information about chronic disease management that improves their ability to deliver safe and appropriate care for their family members, navigating health care and home care arrangements, and enabling out-of-town family to better manage the burdens of caregiving.

Exhibit ES.6: Utilization and Quality of Care Effects Associated with HCIA One Interventions, by Awardee

Awardee	Evaluation Design	Data		Average Quarterly Impact							
				Hospitalizations		ED Visits		30-day Readmissions		Quality of Care	
		Medicare	Medicaid	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval
BIDMC	H	■		1	[-19, 21]	20	[-3, 43]	-8	[-21, 5]	7-day PFU: 12	[-7, 31]
										30-day PFU: 23**	**[7, 39]**
CLTCEC	C (entire period of performance)	■		37	[-15, 89]	-29	[-73, 15]	10	[-10, 30]	ACS: 83	[-1,167]
	C (2nd year only)	■				**-44*****	**[-61,-27]**				
CKRI	C	■		21	[-35, 77]	10	[-46, 66]				
			■	-18	[-56, 20]	29	[-19, 77]				
DDHS	C	■		8	[-12, 28]	0	[-27, 27]	48	[-45, 141]	ACS: 0	[-5, 5]
			■	-21	[-53, 11]	**-57****	**[-102, -12]**				
J-CHiP	H	■		**11***	**[0,22]**	-10	[-21, 1]	**14****	**[4, 24]**	**7-day PFU: -41*****	**[-51, -31]**
										30-day PFU: -29***	**[-40, -18]**
			■	**53****	**[18, 88]**	**-134*****	**[-161, -107]**	6	[-25, 36]	**7-day PFU: -70*****	**[-92, -48]**
										30-day PFU: -184***	**[-212, -156]**
	C	■		**-17*****	**[-27, -7]**	**-16****	**[-26, -6]**	-2	[-31, 27]	ACS: 3	[-4, 10]
			■	**-31*****	**[-39, -23]**	**-48*****	**[-59, -37]**	**-36****	**[-64,-8]**	**PAH: -7*****	**[-11, -3]**
JHU SON	C	■		-5	[-34, 24]	2	[-30, 34]	-71	[-183, 41]	ACS: 7	[-7, 21]
			■	-12	[-28, 4	-9	[-29, 11]				
LifeLong	C		■	**-148*****	**[-244, -52]**	**-150*****	**[-259, -41]**				
Northland	C	■		6	[-12, 24]	**23***	**[0, 46]**	-8	[-64, 48]	ACS: 11	[-5, 27]
PCCSB	C	■		**-17****	**[-25, -9]**	**-24*****	**[-36, -12]**	-5	[-40, 30]	ACS: -2	[-7, 3]
PRHI	H	■		5	[-13, 23]	-11	[-31, 9]	13	[-6, 32]	**7-day PFU: 68*****	**[32, 104]**
										30-day PFU: 33***	**[14, 52]**
	H (180-day)	■		-2	[-22, 18]	**-26***	**[-48, -4]**				
PPMC	C (Health Resilience Program)		■	-19	[-45, 6]	10	[-21, 42]				

Awardee	Evaluation Design	Data		Average Quarterly Impact							
				Hospitalizations		ED Visits		30-day Readmissions		Quality of Care	
		Medicare	Medicaid	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval
	C (New Directions)		■	-51	[-126, 23]	**-162*** **	**[-250, -75]**				
	C (ED Guides)		■	**-15*** **	**[-24, -6]**	**60*** **	**[39, 80]**				
	C (Standard Transitions)		■	1	[-93, 95]	**154*** **	**[100, 208]**				
	C (C-TRAIN)		■	-52	[-153, 50]	39	[-19, 97]				
St. Francis	H	■		-16	[-106, 74]	54	[-43, 151]	4	[-64, 72]	7-day PFU: 92	[-15, 199]
										30-day PFU: 26	[-73, 125]
	C	■		25	[-11, 61]	10	[-32, 52]	5	[-76, 86]	ACS: -2	[-27, 23]
SCRF	C	■		20	[-18, 58]	3	[-37, 43]	**112***	**[13, 211]**	ACS: 4	[-16, 24]
Sutter Health§	C (EOL)	■		**-71*** **	**[-90, -52]**	**28*** **	**[13, 43]**				
UEMS	C		■	**-15***	**[-31, 0]**	**-143*** **	**[-166, -121]**			7-day PFU: -8	[-24, 39]
										30-day PFU: 7	[-31, 45]
										90-day PFU: -69* **	**[-108, -30]**
										PAH: 2	[-6, 9]
U Iowa	H	■		54	[-20, 128]	22	[-51, 95]	46	[-20, 112]	7-day PFU: 6	[-71, 83]
										30-day PFU: 85 **	**[16, 154]**
U New Mexico	C		■	-16	[-39, 7]	13	[-19, 45]	-39	[-101, 23]	PAH: -9	[-23, 5]
U North Texas	H (SNF)	■		3	[-14, 20]	10	[-5, 25]	-5	[-19, 9]		
	C (AL/MC)	■		**-26*** **	**[-38, -14]**	-5	[-20, 10]	**-336***	**[-629, -43]**	**ACS: -6***	**[-12, 0]**
URI	C	■		2	[-17, 21]	2	[-26, 30]			ACS: 6	[-7, 19]
UT Houston	C (Phase 1)		■	**-36** **	**[-66, -6]**	**-83*** **	**[-119, -47]**				
VUMC	H (SNF)	■		17	[-14, 48]	-11	[-43, 21]	25	[-3, 53]	**30-day PFU: 58*** **	**[43, 73]**
						Count: -70*	**[-136, -4]**				

NOTES: *p<0.10, **p<0.05, ***p<0.010. **BOLD font** indicates statistical significance at the p<0.10 level or greater. Shaded cells indicate areas where no data are available. Calculation of average length of enrollment is based on finder files that may extend beyond June 20, 2015, for selected awardees with a no-cost extension, and the estimated changes in utilization are based on analysis of claims for period that may extend beyond June 30, 2015. PFU = practitioner follow-up visit post-discharge; EOL = end of life analysis; PAH = potentially avoidable hospitalization; ACS = ambulatory care-sensitive hospitalization' SNF = skilled nursing facility analysis; AL/MC = assisted living/memory care residence analysis. Count: Measure estimates the number of ED visits within a quarter, rather than the number of beneficiary-episodes with an ED visit in an average quarter. §Primary analysis for Sutter Health is for beneficiaries in the last 30 days of life and is a differences (time-series) rather than DID analysis; our DID analysis of the experiences of all beneficiaries over the full performance period does not reliably model the intervention's impacts, due to the inability to construct a comparison group with similar life trajectories, and is included in Appendix D.

Observations across Groups of Beneficiaries

Dose or length of enrollment may moderate impact or ability to measure change. NORC's Second Annual Report to CMMI (2016) notes how the outcomes measured may vary with the length of the post-intervention time period over which participants' experience is observed. The number of claims quarters of data for this evaluation, and the three-year implementation period, may not match the time period in which impact would be expected. In some cases, savings may appear only in certain time frames. For example, CLTCEC shows increases in cost of care over the entire period of performance (average quarterly loss of $1,175 per beneficiary) and no statistically significant utilization findings. However, if you examine outcomes for participants starting in the second year, there are estimated savings (average quarterly savings of -$1,522 per beneficiary) and a decrease in ED visits per quarter (-44 per 1,000 beneficiaries). For this home bound, high risk population, it may take a period of time to stabilize the population before impacts can be realized. LifeLong's impacts are not statistically significant in the first year, but show promising reductions in quarterly hospitalizations (-148 per 1,000 beneficiaries) and ED visits per quarter (-150 per 1,000 beneficiaries) that begin in the first year and continue through the period of performance. In contrast, U North Texas's finding of cost savings from its SNF arm at 30-days post-enrollment (average quarterly savings of -$449 per 1,000 beneficiary-episodes) loses significance when measured at 90-days post-enrollment. Similarly, PRHI's congestive heart failure (CHF) enrollees, as a group, show significant increases in cost and in hospitalizations when measured at 90-days post-discharge, findings that lose significance when measured at 180-days post-discharge.

Impacts may vary by diagnosis or condition within a specific intervention. For PRHI, cost savings across all beneficiaries do not reach statistical significance. Yet, we do find statistically significant savings for beneficiaries with AMI (average savings over 180 days of -$7,907 per beneficiary-episode) and, alternatively, increased expenditures for beneficiaries with CHF (average quarterly loss of $2,324 per beneficiary-episode), the latter accompanied by increased hospitalizations per quarter (28 per 1,000 beneficiary-episodes) and readmissions per quarter (30 per 1,000 beneficiary-episodes). In addition, significant reductions in ED visits per quarter are seen for beneficiaries with chronic obstructive pulmonary disease (COPD) but not for those with acute myocardial infarction (AMI) or CHF.

Savings may be considerable at the end of life. There are statistically significant cost savings for beneficiaries enrolled during their last 30 days of life (average savings of -$861 per beneficiary) and 90 days of life (average savings of -$2,122 per beneficiary) in the U North Texas AL/MC arm and for beneficiaries in the Sutter Health program (average 30-day savings of -$5,657 per beneficiary). VUMC achieved savings for persons enrolled in their last 30 days of life but these did not reach statistical significance.

Limitations of Analyses

While claims-based findings may reach statistical significance, the validity and reliability of analyses reflect a number of caveats related to the availability and quality of claims data. There are no claims data for two awardees (CCNC, UAMS) and a lack of representative claims data for three awardees (CLTCEC, DDHS, SCRF). In addition, for eight awardees, there are fewer than eight quarters (two years) of claims data available for one or more outcome measures. Finally, there are eight analyses—either of an intervention overall or of an intervention arm—where a small analytic sample size (defined as fewer than

300 beneficiaries or beneficiary-episodes, depending on the evaluation design) means that an analysis is underpowered and its findings should be interpreted with caution.

Summary, Outcomes

Eight awardees out of 21 for which claims data were available have demonstrated cost savings (total cost of care), with seven also showing a statistically significant improvement on at least one CMMI core performance measure related to utilization or quality of care. To better convey the degree of confidence in the reliability of these findings, we consider these eight awardees in terms of how completely the claims included in analysis of each awardee reflect the full initial period of performance under HCIA One funding. For five of the eight awardees (CKRI, J-CHiP, Sutter Health, U Iowa, U North Texas), the claims used to develop estimates of program effectiveness represent 60 percent or more of those for the performance period; for this reason, it is likely that the estimates are representative of each awardee's overall performance. For three of the eight awardees (UEMS, U New Mexico, PPMC), our analyses are based on claims from 50 percent or less of the initial performance period; further analyses conducted with additional quarters of claims data, for example, as part of NORC's no-cost addendum report, may yield estimates of program effectiveness that differ from those presented in this report and for this reason, findings for these three awardees should be considered with greater caution.

In addition, we identify eight awardees (BIDMC, CLTCEC 2nd year, DDHS, LifeLong, PCCSB, PRHI, UT Houston, VUMC) for whom program effectiveness findings are positive for improved utilization and/or quality of care. For seven of the eight awardees, cost data are available (all except for LifeLong); for these seven awardees, improved outcomes are associated with no statistically significant changes in total cost of care (cost savings are seen for subgroup analyses). Except for one awardee (DDHS), the claims used to develop estimates represent over 60 percent of the awardee's initial performance period, indicating that these estimates are likely representative of overall performance.

Awardees with Cost Savings, Representative of Performance Period

- *Courage Kenney Rehabilitation Institute (CKRI).* A medical home serving beneficiaries with physical disabilities, including spinal cord injury, traumatic brain injury, and musculoskeletal conditions. Primary and specialty care are co-located with referrals for community service and supports and classes taught jointly by a nurse care manager and peer.

  Positive Outcome: average quarterly savings (-$1,943 per beneficiary, Medicaid).

  Negative Outcome: none.

- *Johns Hopkins Community Health Partnership (J-CHiP). Hospital Arm.* Multidisciplinary teams deliver and coordinate care for beneficiaries discharged from two hospitals, the Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, in partnership with five skilled nursing facilities. This arm is part of a multifaceted innovation that builds on pre-existing, evidence-based programs including daily multidisciplinary rounding and early risk-screening for complex discharge needs. Components also include a Meds for Home Program and pharmacy extenders, home visits or post-discharge phone calls, and patient education.

Positive Outcomes: average quarterly cost savings (-$1,115 per beneficiary-episode, Medicare; and -$4,987 per beneficiary-episode, Medicaid) and fewer ED visits per quarter (-134 per 1,000 beneficiary-episodes, Medicaid).

Negative Outcomes: increased hospitalizations per quarter (11 per 1,000 beneficiary-episodes, Medicare; and 53 per 1,000 beneficiary-episodes, Medicaid), 30-day hospital readmissions per quarter (14 per 1,000 beneficiary-episodes, Medicare), and fewer practitioner follow-up visits post-discharge per quarter (-41 7-day visits and -29 30-day visits per 1,000 beneficiary-episodes, Medicare; and -70 7-day visits and -184 30-day visits per 1,000 beneficiary-episodes, Medicaid).

- *Johns Hopkins Community Health Partnership (J-CHiP). Community Arm.* Health behavior specialists and community health workers (CHWs) deliver care coordination and enhanced primary care (mental health and substance abuse services) at eight clinics in East Baltimore. Two community organizations, Sisters Together and Reaching (STAR), and the Men and Families Center (M&FC), provide direct patient outreach and supportive services by Neighborhood Navigators and CHWs, including care management, to targeted neighborhoods.

  Positive Outcomes: average quarterly cost savings (-$1,756 per beneficiary, Medicaid), fewer hospitalizations per quarter (-17 per 1,000 beneficiaries, Medicare; and -31 per 1,000 beneficiaries, Medicaid), and fewer ED visits per quarter (-16 per 1,000 beneficiaries, Medicare; and -48 per 1,000 beneficiaries, Medicaid). Fewer 30-day hospital readmissions per quarter (-36 per 1,000 beneficiaries, Medicaid) and fewer potentially avoidable hospitalizations per quarter (-7 per 1,000 beneficiaries, Medicaid).

  Negative Outcomes: none.

- *Sutter Health, End of Life Experience*. For patients with late-stage disease and their caregivers, the Advance Illness Management (AIM) innovation coordinates care across multiple settings (hospital, home health, provider offices, on-call triage), supported by a unified electronic health record and rubric of five pillars of care, nurse-led multidisciplinary teams, and advance care planning. Sutter Health piloted an earlier version of AIM in 2009 and used HCIA One funding to scale a revised, evidence-based AIM model across 11 sites affiliated with Sutter Health.

  Positive Outcomes: in the last 30 days of life, average cost savings (-$5,657 per beneficiary) and fewer hospitalizations (-71 per 1,000 beneficiaries).

  Negative Outcome: more ED visits in the last 30 days of life (28 per 1,000 beneficiaries).

- *University of Iowa (U Iowa)*. Four nurse-led transitional care teams facilitate discharge of beneficiaries with physical and/or psychiatric diagnoses from the University of Iowa Hospital and Clinics to ten rural critical access hospitals, skilled nursing facilities, or beneficiaries' homes in nine counties across the state. Each team comprises a nurse, social worker, pharmacist, and physician located at U Iowa, together with a rural care coordinator (nurse or social worker) based at each critical access hospital. Care coordinators make a home visit within 72 hours post-discharge, facilitate referrals to community benefits and supports, and participate in interdisciplinary care planning.

  Positive Outcomes: average quarterly cost savings (-$5,533 per beneficiary-episode) and more 30-day practitioner follow-up visits per quarter (85 per 1,000 beneficiary-episodes).

  Negative Outcome: none.

- *University of North Texas, Assisted Living/Memory Care Arm.* U North Texas and implementation partner Brookdale Senior Living (BSL) scaled a pre-existing pilot of INTERACT quality improvement tools for use in skilled nursing facilities, assisted living/memory care and independent living residences, and home health agencies in five states. INTERACT facilitates communications and data-sharing among clinical and non-clinical BSL staff (Associates), and between BSL and partner hospitals for transitional care.

  Positive Outcomes: average quarterly cost savings (-$1,095 per beneficiary), fewer hospitalizations per quarter (-26 per 1,000 beneficiaries), fewer 30-day hospital readmissions per quarter (-336 per 1,000 beneficiaries), and fewer ambulatory care-sensitive hospitalizations per quarter (-6 per 1,000 beneficiaries).

  Negative Outcome: none.

Awardees with Cost Savings, Reflecting Limited Period of Performance

- *Providence Portland Medical Center (PPMC), ED Guides and New Directions Arms.* The Health Commons innovation is co-sponsored by Health Share of Oregon, a regional coordinated care organization that serves three counties. The ED Guides and New Directions Arms are two of nine programs within Health Commons, all of which are guided by the Trauma Informed Care model. Both programs are ED diversion models targeting high utilizer beneficiaries with a behavioral health diagnosis. Since program effectiveness findings for PPMC are based on a limited sample and period of performance, we advise that results for this awardee be viewed with caution.[2]
  Positive Outcomes: average quarterly cost savings for New Directions (-$1,220 per beneficiary) and ED Guides (-$381 per beneficiary), fewer ED visits per quarter for New Directions (-162 per 1,000 beneficiaries), and fewer hospitalizations per quarter for ED Guides (-15 per 1,000 beneficiaries).
  Negative Outcomes: more ED visits per quarter for ED Guides (60 per 1,000 beneficiaries).

- *University Emergency Medical Services (UEMS).* A team of CHWs recruit high utilizer beneficiaries at one ED (Erie County Medical Center) and hospital-affiliated outpatient clinics, providing weekly one-on-one coaching to facilitate patient-directed goal-setting, navigation, referrals to community benefits and services, and strengthened connections to primary care.
  Positive Outcomes: average quarterly cost savings (-$717 per beneficiary), fewer hospitalizations per quarter (-15 per 1,000 beneficiaries). and fewer ED visits per quarter (-143 per 1,000 beneficiaries).
  Negative Outcomes: fewer practitioner follow-up visits post-ED discharge per quarter, at 90-days post-discharge (-69 per 1,000 beneficiaries). The observed decrease in quality of care likely reflects difficulty in scheduling timely primary and specialty care appointments for enrolled beneficiaries, as well as the loss to follow-up of participants.

- *University of New Mexico.* This program expands on the Project ECHO model to deliver weekly virtual grand rounds, linking a team of specialists at the University of New Mexico with multidisciplinary outpatient intensivist teams at six sites around the state. The teams deliver clinic and home-based care to high-risk adult Medicaid beneficiaries.
  Positive Outcomes: average quarterly cost savings (-$2,044 per beneficiary).
  Negative Outcome: none.

[2] Program effectiveness findings for PPMC are interim, limited to participants enrolled over two-four quarters in the post-intervention period.

Awardees Serving Complex, High-Risk Patients: Policy-Relevant Themes and Lessons for Delivery System Reform

Our evaluation focuses primarily on considering each awardee individually. Yet, there are important, policy-relevant themes that emerge from comparisons across pairs or groups of awardees testing or scaling a similar model, identifying best practices for reaching high-risk populations, and endeavoring to hire and train health care and home care workers to perform effectively and efficiently implement new models of care. These themes have particular relevance for delivery system reform.

Priority Populations

Medicaid and Dually Eligible Beneficiaries. Twelve awardees serve Medicaid and dually eligible populations (CLTCEC, CKRI, J-CHiP, JHU SON, LifeLong, Northland, PCCSB, PPMC, St. Francis, SCRF, UEMS, U New Mexico). Two common program components comprise home visits and the co-location of staff who make referrals to community benefits and supports. Most commonly, nurses make such referrals, followed by CHWs and lay health workers, social workers, and behavioral health specialists. For medically complex populations living in low- or moderate-income households, referrals for Meals on Wheels, transportation, affordable housing, and other community services are a critical and under-recognized aspect of care, similar to long-term services and supports in that these referrals enable Medicare-funded health services to be delivered efficiently and effectively. Our claims-based analyses of awardees that serve Medicaid expansion populations and those targeting dually eligible beneficiaries find statistically significant cost savings for six of eleven awardees for whom cost data are available, with mixed findings on utilization and quality of care. Comparing the claims experience of dually eligible and those enrolled only in Medicaid (J-CHiP), we find that cost savings are attenuated for duals, likely reflecting the greater difficulty of addressing the higher acuity and more complex social risk factors faced by older beneficiaries in low-income households.

Beneficiaries Living with Late-Stage Illness. Eleven awardees take a variety of approaches to advance care planning (BIDMC, J-CHiP, Northland, PCCSB, PRHI, PPMC, SCRF, Sutter Health, U New Mexico, U North Texas, VUMC). Shorter-term transition of care interventions (J-CHiP, VUMC) or those with a care planning focus (SCRF) offer one-time creation or updating of an advance directive. Longer duration patient and caregiver engagement creates opportunities for periodic conversations and updating of advance directives and more comprehensive advance care planning (Northland, PCCSB, Sutter Health, U North Texas). Hiring staff with previous experience in hospice care (e.g., RNs who have facilitated advance care planning conversations) and training intervention staff in communication techniques and end-of-life planning, are critical to the success of advance care planning. Three external factors are influential in advance care planning, including state regulations around care planning, access to hospice or palliative care services for Medicaid beneficiaries, and family and participant beliefs about the end of life. Our claims-based estimates of outcomes (program effectiveness) show statistically significant cost savings for five out of the eleven awardees and a mixed set of utilization outcomes.

Beneficiaries with a Behavioral Health and/or Substance Abuse Diagnosis. Five awardees focus on individuals with behavioral health and/or substance abuse diagnoses (CKRI, J-CHiP, LifeLong, PPMC, U

New Mexico). This high-needs population is often marginalized and overlooked because they can be difficult to engage in primary care and patient education, and beneficiaries can incur high health care expenditures as a result of frequent ED visits and hospitalizations. Individuals targeted by these awardees often face substantial unmet social service needs. Intervention components include integration of primary and mental health care by coordinating care among providers, or co-location of primary and mental health care providers, and establishing a primary care provider for the beneficiary. Program models feature lay health workers and a focus on training, particularly the Trauma-Informed Care approach (PPMC, U New Mexico) and the use of motivational interviewing with clients. Awardees have demonstrated success in achieving cost savings, with mixed utilization findings. It is important to hire skilled staff who can be responsive to clients and empowered to take the necessary time to build trust with their patients. All awardee programs referred participants to community resources to help address these social determinants of health, noted by both staff and participants as critical to addressing beneficiary health needs.

Beneficiaries Living with an Intellectual and/or Developmental Disability (I/DD). Two awardees (DDHS, URI) that serve this population show promise, despite many challenges. Our findings point to the value of care coordination for beneficiaries living with I/DD and the importance of capitated funding to enable providers to meet the needs of beneficiaries for visits longer in duration than most office consultations, to allow time for discussion, patient input and education, and medication reconciliation. The relatively small numbers of beneficiaries enrolled, and the three-year time period for the HCIA-supported demonstrations, make it unlikely that positive impact would be seen on the CMMI core measures, or even on supplemental measures developed by the awardees.

Workforce Development

Workforce Satisfaction. Many transitional care and care coordination programs require a considerable level of staff commitment and availability for their clients. The sheer number of staff is also critical for fully implementing and growing a program; a number of awardees have observed that hiring and retaining project staff are the most important determinants of intervention success. NORC workforce trainee surveys of four awardees (CCNC, PPMC, PRHI, Sutter Health), conducted as part of this evaluation, allow us to assess how staff members' interactions with patients influences perceived workforce reward, across different levels of stress. In dynamic and fast-paced intervention settings, enabling and training staff to establish meaningful connections with beneficiaries can strengthen intrinsic rewards, empowering them to contribute to improving patient quality of life and health outcomes. While diverse in their goals, these four awardees are alike in treating medically complex beneficiaries in a time-limited context and a dynamic workplace environment. These common threads are correlated with higher levels of perceived workforce reward across stress levels.

Training of Personal Care Aides. Three awardee training programs for personal care aides (CLTCEC, SCRF, UAMS) have graduated nearly 11,000 members of the home care workforce, who will be better prepared to support innovative approaches to health care delivery. While claims-based findings are limited, offering little evidence of impact on core CMMI performance metrics, and all three awardees reported difficulty in recruiting prospective trainees, the training courses earned high marks from participants. Trainees report learning useful knowledge about chronic disease, new skills in communicating with clients and providers, stress reduction and self-care, and delivering care at home. Most express greater confidence in their own preparation and ability to perform their job. Trainees

describe a range of benefits, from greater satisfaction with work assignments to higher wages (in the case of UAMS-trained caregivers). Organizations seeking to replicate or scale these training models should consider the scaling challenges faced by UAMS and CLTCEC, with each having to address the specific licensure or credentialing requirements for personal care aides in each jurisdiction (county or state) where training was offered.

Use of Lay Health Workers. The high acuity of beneficiaries targeted by many of our awardees, and the incentive to seek Medicare reimbursement, means that many of the models and practices being piloted or scaled employ licensed clinicians, typically nurses, and less often, social workers or behavioral health specialists with at least a bachelor's degree, to perform care coordination, patient navigation, and referrals to community benefits and supports (e.g., food, transportation, housing). Yet seven awardees (CCNC, CKRI, J-CHiP, LifeLong, UEMS, U New Mexico, URI) have employed lay health workers, either CHWs or peer educators, to engage beneficiaries who are members of historically underserved groups or are otherwise considered hard to reach. Organizations that would incorporate a CHW or peer coach into clinical workflow should consider conducting feasibility assessments of the available workforce; ensuring oversight by clinical staff; securing acceptance of lay worker involvement by physicians, nurses, and other clinicians; clarifying roles and expectations across teams; seeking mentorship from similar organizations with successful programs; and partnering with State Medicaid plans from the beginning of the program.

Sustainability and Spread in the Context of Delivery System Reform

Findings from qualitative and survey data indicate that favorable payer arrangements, alignment of innovation with partners and stakeholders, robust organizational resources, and community resources (to address social determinants of health) are important for sustaining, replicating, and scaling innovation for this HCIA One portfolio.[3] In addition, we find many diverse ways of scaling innovation impacts, not only through direct expansion of existing innovations but also by carrying forward discrete components of the innovations and in advocating for models of care for these high-risk, complex populations that other organizations can adopt and scale in the future.

Awardee Strategies to Scale Innovation

- Replicate program within home institution, system, or externally
- Expand innovation components or a scaled-down innovation
- Hand-off/transfer innovation components to another institution
- Scale ideas/disseminate lessons widely

Conclusions

Overall, we conclude that there are important hospital- and community-based models within the complex/high-risk patient targeting portfolio worth highlighting.

Among this HCIA portfolio of 23 awardees:

- Eight awardee innovation or intervention arms demonstrate Medicare or Medicaid cost savings, including five awardees for whom claims data cover a substantial portion of the initial performance

[3] The sustainability factors listed here are based on qualitative findings.

period (at least 60 percent) and three awardees for whom claims data are more limited (less than 50 percent of the initial performance period).

- Eight awardees demonstrate improved utilization and/or quality of care, without evidence of statistically significant changes in total cost of care; for seven of the eight, the claims used to develop estimates represent over 60 percent of the awardee's initial performance period, indicating that these estimates are likely representative of overall performance.

These findings are corroborated by qualitative assessments and survey findings demonstrating improved functioning for enrolled beneficiaries, as well as greater beneficiary and caregiver satisfaction. Furthermore, we provide insights about strategies that awardees have used to best serve priority populations, such as beneficiaries living with intellectual and/or developmental disability, and to make optimal use of the existing health care workforce, including CHWs. Finally, we describe how awardees in the complex/high-risk patient targeting portfolio have sought to sustain, replicate and in some cases scale their impacts—often despite challenging circumstances and in light of delivery system reforms occurring in their respective states.

Introduction and Methods

This report is the third annual report to be produced by NORC as part of its evaluation of 23 of the first-round Health Care Innovation Award (HCIA One) 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 chronic conditions (MCC) that put them at higher than average risk for hospitalization or re-admission.[4] This report offers a public update to our evaluation following its third year (August 31, 2015 through July 30, 2016) and synthesizes our findings across each awardee's full implementation period with HCIA support. We present a case study for each awardee, as well as a set of theme-based cross-awardee findings that are both policy-relevant and offer lessons for delivery system and payment reform.

Our evaluation, like those of the other front-line evaluators for HCIA One, 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 awardee. 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 One evaluations share the same set of broad objectives, namely, to document:

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

Key outcomes of interest (e.g., core measures) include total cost of care, utilization (all-cause hospital admissions, emergency department visits, hospital readmissions), quality of care (e.g., ambulatory care-sensitive hospitalizations, practitioner follow-up visits post-hospital discharge, potentially avoidable hospitalizations), and patient health and well-being. Four of the awardees are implementing innovations that have two or more distinct programs or arms, each of which is assessed separately. These awardees include J-CHiP (post-acute care or hospital-based arm and ambulatory care community arm), PPMC (NORC's evaluation considers the six arms for which adequate claims data are available), St. Francis (post-acute care or hospital-based arm and ambulatory care community arm), and U North Texas (implementation in skilled nursing facilities, assisted living/memory care residences, and independent living residences).

[4] 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.

This report includes a brief overview of the complex high-risk awardee portfolio; 23 awardee chapters, each in the form of a case study; a discussion of cross-awardee themes for the portfolio; and supporting appendices. See Exhibit 1.1 for a list of the 23 awardees in the Complex/High-Risk Patient Targeting portfolio, with funding amounts.[5]

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

Awardee	Amount	Intervention	State(s)
Beth Israel Deaconess Medical Center (BIDMC)	$4,937,189	Post-Acute Care Transitions	MA
California Long-Term Care Education Center (CLTCEC)	$11,831,443	Care Team Integration of the Home-Based Workforce	CA
Community Care of North Carolina (CCNC)	$9,327,422	Child Health Accountable Care Collaborative	NC
Courage Kenny Rehabilitation Institute (CKRI)	$1,767,667	Advanced Primary Care Clinic	MN
Developmental Disabilities Health Services (DDHS)	$3,701,525	Developmental Disabilities Health Home	NJ, NY
Johns Hopkins University (J-CHiP)	$19,920,338	Community Health Partnership	MD
Johns Hopkins University School of Nursing (JHU SON)	$4,075,344	Project Community Aging in Place, Advancing Better Living for Elders	MD
LifeLong Medical Care (LifeLong)	$1,109,229	LifeLong Comprehensive Care Initiative	CA
Northland Healthcare Alliance (Northland)	$2,726,216	Northland Care Coordination for Seniors	ND
Palliative Care Consultants of Santa Barbara (PCCSB)	$4,253,215	Doctors Assisting Seniors at Home	CA
Pittsburgh Regional Health Initiative (PRHI)	$10,412,359	Primary Care Resource Center	PA, WV
Providence Portland Medical Center (PPMC)	$17,337,094	Health Commons	OR
South Carolina Research Foundation (SCRF)	$2,884,719	HOMECARE+	SC
St. Francis Healthcare Foundation of Hawaii (St. Francis)	$5,299,706	Home Outreach Program and E-Health (H.O.P.E.)	HI
Sutter Health Corporation (Sutter Health)	$13,000,000	Advanced Illness Management	CA
University Emergency Medical Services (UEMS)	$2,562,937	Better Health through Social and Health Care Linkages Beyond the Emergency Department	NY
University of Arkansas for Medical Sciences, Schmieding Center (UAMS)	$3,518,798	Cost-Effective Delivery of Enhanced Home Caregiver Training	AR, CA, HI, TX
University of Iowa Hospitals and Clinics (U Iowa)	$7,662,278	Transitional Care Teams	IA
University of New Mexico Health Sciences Center (U New Mexico)	$8,401,614	Extension for Community Healthcare Outcomes (ECHO) Care	NM
University of North Texas Health Science Center (U North Texas)	$7,329,714	Brookdale Senior Living Transitions of Care	CO, FL, KS, TN, TX
University of Rhode Island (URI)	$10,202,795	Living RIte Centers	RI
University of Texas Health Sciences Center (UT Houston)	$3,701,370	High-Risk Children's Clinic	TX
Vanderbilt University Medical Center (VUMC)	$2,449,241	Reducing Hospitalizations in Medicare Beneficiaries	KY, TN

[5] Awardee self-reported data through March 31, 2016 (HCIA Reporting Quarter 15) indicates that all awardees had spent 75 percent or more of their award and 14 awardees spent 90 percent or more of their award; for eight awardees with no-cost extensions through June 30, 2016, final financial information is not yet available to NORC.

In this chapter, we present a brief overview of our approach to evaluation, our evaluation methods and data sources, and a top-level overview of the 23 awardees; please see the technical appendices for more detail on methods and data sources.

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 nine quarterly reports—offering rapid-cycle feedback on an ongoing basis—and two summative, public annual reports.[6]

In addition to this third summative report, we plan to develop a supplemental report of claims-based assessments of program effectiveness, to cover the no-cost extension period for selected awardees. Fourteen of the awardees have continued to operate beyond June 30, 2015 using HCIA One funds, under no-cost extensions granted for up to 12 months each (through June 30, 2016). In NORC's no-cost addendum report, the claims experience of these 14 awardees during their respective no-cost-extension periods will be analyzed; in addition, this addendum report will enable us to present Medicaid claims data for selected awardees through the end of the initial funding period (June 20, 2015), where such data are not available for use in our third annual report.

Exhibit 1.2 depicts the conceptual framework for our evaluation. Previous NORC annual reports to CMMI presented updates on our 23 awardees, including outcomes findings where available, and detailed information about intervention components, the implementation experience, and workforce. This report is comprised of case study summaries for the 23 awardees, emphasizing outcomes and updates on implementation in each awardee's final months of HCIA One support. It also includes a short chapter on cross-awardee themes and a set of supporting technical appendices.

[6] 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), Seventh (September 2015), Eighth (January 2016), and Ninth (April 2016).

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

Quantitative Methods (Claims Based Analyses)

Our evaluation uses Medicare and Medicaid claims data to assess the impact of awardee programs on measures of health care cost, utilization, and quality of care.[7] 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 (DID) 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.

Evaluation Design

We identify two broad groups of interventions among the awardees based on the setting and goals of the intervention: post-acute care (PAC) interventions (hospital design), which seven awardees operate, and ambulatory care programs (community design), conducted by 18 awardees. Four awardees, J-CHiP, PPMC, St. Francis, and U North Texas, conduct both kinds of programs.

- **Hospital Design:** post-acute care (PAC) interventions focus on improving patient outcomes during or immediately after a 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.
- **Community Design:** 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.[8]

[7] The time period of claims data collection varies by awardee. The specific claims period is identified in each awardee-specific chapter.

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

Exhibit 1.3: Evaluation Design by Awardee Intervention Type

	Hospital Design	Community Design
Intervention Overview	Participant selection event based, focused on transition from inpatient to post-acute settings for beneficiaries with the targeted conditions	Participant selection from the community, often a convenience sample of beneficiaries 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	Beneficiary-episode	Beneficiary
Internal Comparison (pre-period)	Beneficiary-episodes at awardee facilities before start of intervention	Beneficiaries before enrollment in the intervention
External Comparison (pre and post-periods)	Beneficiary-episodes from similar facilities from time periods before and after the intervention was implemented	Beneficiaries 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 21 of the 23 awardees in our portfolio, we assess program effectiveness using either Medicare claims (11 awardees), Medicaid encounter/claims data (four awardees), or both Medicare and Medicaid claims (five awardees). For two awardees, we do not have claims data for use in this evaluation.

Exhibit 1.4: Data Source and Evaluation Design, by Awardee

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

NOTE: Unless noted, we use DID analyses to assess program effectiveness.

Measures of Program Effectiveness

Our analyses estimate the impact of the interventions on measures of cost, utilization, and quality of care. For awardees with Medicare or Medicaid claims data, we assess impact on four core measures.[9] These core measures, which CMMI uses to assess the performance of a broad range of health care innovations, are expressed in units of 1,000 beneficiary-episodes (for the hospital evaluation design) or per 1,000 beneficiaries (for the community evaluation design), except for cost measures, which are either per beneficiary-episode (hospital design) or per beneficiary (community design). The core measures are as follows:

- total cost of care
- all-cause hospitalizations
- emergency department (ED) visits
- 30-day readmissions

Where feasible, we add supplemental measures related to the quality of care, in units as described above, including:

- ambulatory care-sensitive hospitalizations
- practitioner follow-up visits (usually post-discharge from a hospital stay)
- potentially avoidable hospitalizations

Exhibit 1.5 summarizes the claims-based measures used to evaluate each of the awardee programs.

Exhibit 1.5: Claims-Based Measures of Program Effectiveness, by Awardee

Awardee	Evaluation Design	Claims Data	Outcome Measures						
			CMMI Core Measures				Supplemental Measures		
			Total Cost of Care	Hospitalizations	Emergency Department Visits	Readmissions	Ambulatory Care-sensitive Hospitalizations	Potentially Avoidable Hospitalizations	Practitioner Follow-up Visits
BIDMC	H	Medicare	■	■	■	■			■
CLTCEC	C	Medicare	■	■	■	■	■		
CKRI	C	Medicare	■	■	■				
		Medicaid	■	■	■				
DDHS	C	Medicare	■	■	■	■	■		
		Medicaid	■	■	■				
J-CHiP	H	Medicare	■	■	■	■			■
		Medicaid	■	■	■	■			■
	C	Medicare	■	■	■	■	■		
		Medicaid	■	■	■	■		■	
JHU SON	C	Medicare	■	■	■	■	■		
		Medicaid	■	■	■				

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

Awardee	Evaluation Design	Claims Data	Outcome Measures						
			CMMI Core Measures				Supplemental Measures		
			Total Cost of Care	Hospitalizations	Emergency Department Visits	Readmissions	Ambulatory Care-sensitive Hospitalizations	Potentially Avoidable Hospitalizations	Practitioner Follow-up Visits
LifeLong	C (1st year)	Medicaid		■	■				
	C (2nd year)	Medicaid		■	■				
Northland	C	Medicare	■	■	■	■	■		
PCCSB	C	Medicare	■	■	■	■	■		
PRHI	H	Medicare	■	■	■	■			
PPMC	C (Health Resilience)	Medicaid	■	■	■				
	C (New Directions)		■	■	■				
	C (ED Guides)		■	■	■				
	C (Standard Transitions)		■	■	■				
	C (C-TRAIN)		■	■	■				
St. Francis	H	Medicare	■	■	■	■			■
	C		■	■	■	■	■		
SCRF	C	Medicare	■	■	■	■	■		
Sutter Health	C (EOL)	Medicare	■	■	■				
UEMS	C	Medicaid	■	■	■			■	■
U Iowa	H	Medicare	■	■	■	■			■
U New Mexico	C	Medicaid	■	■	■	■		■	
U North Texas	H (SNF)	Medicare	■	■	■	■			
	C (AL/MC)		■	■	■	■	■		
	C (EOL)		■	■	■				
URI	C	Medicare	■	■	■		■		
UT Houston	C (Phases 1, 2)	Medicaid	■	■	■				
VUMC	H	Medicare	■	■	■	■			■
	C (Geriatric Syndromes)		■	■	■	■	■		
	C (EOL)		■	■	■				

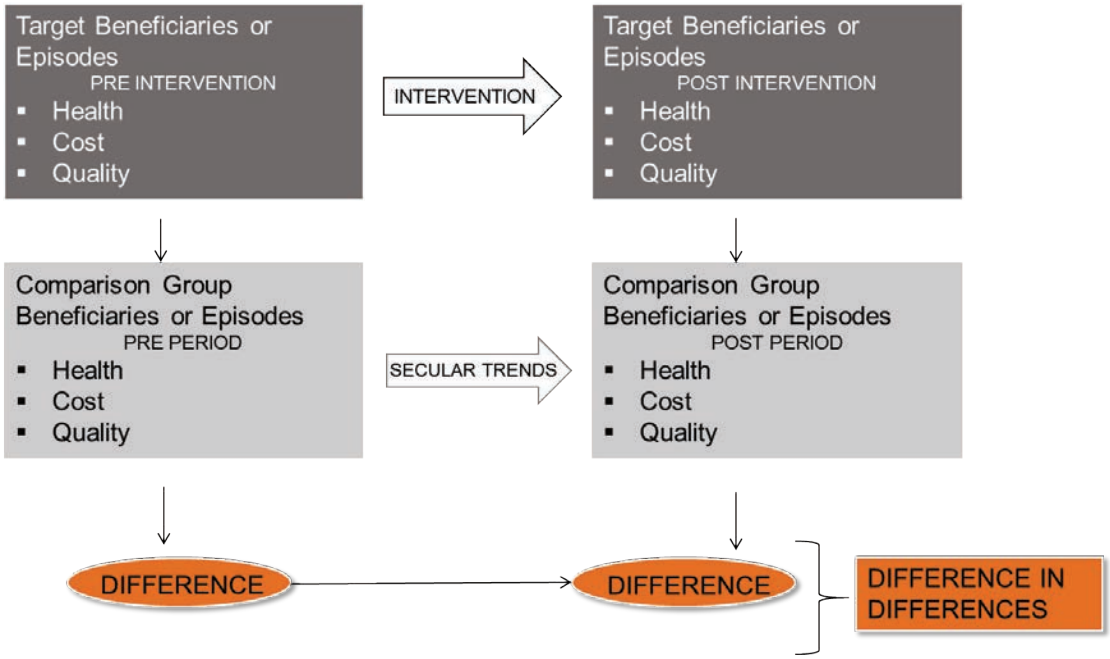
Analytic Methods

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 for all awardees at this time (see Exhibit 1.6). We use time-series analysis for those awardees where DID analysis is not feasible.

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 within the DID framework to minimize observed differences between the treatment and comparison groups. [10]

Exhibit 1.6: Difference-in-Differences Analysis for Post-Acute (Hospital Design) and Ambulatory Care (Community Design) Interventions



For one awardee with comparison groups and limited pre-intervention data (UT Houston), we assess program effectiveness using time-series analyses that compares the average difference between the awardee and the control group after enrollment in the intervention. The specifications of our measures are detailed in Appendix C.

Qualitative Methods (Program Documents, Interviews, and Site Visits)

The primary objectives of the qualitative component of the evaluation are to:

- 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.

Qualitative data sources included program documents, telephone interviews, and site visits. Since preparation of our Second Annual Report to CMMI (2016), new primary data includes a round of phone

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

interviews with awardees that received a no-cost extension (14 awardees) and review of program documents, including those awardees submitted to CMMI. A brief summary follows; please see Appendix G for more detail.

For administrative purposes, NORC grouped the 23 CHRPT awardees into three cohorts by focus of their intervention: post-hospitalization, care coordination; long-term services and supports or in-home care; and specialized interventions that combine elements of post-acute care, long-term services and supports and/or community-based interventions.[11] We assigned staff members to each cohort who served as the point of contact for awardees and who planned and conducted 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

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. We conducted follow-up site visits with a subset of eight awardees in spring 2015 (February through May). In selecting awardees for a follow-up site visit, we considered cases in which: (1) the intervention had been launched relatively late in the award period (2) the intervention was being implemented in multiple locations and the first site visit did not permit a balanced sampling of these locations (3) the 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, or (4) the awardee seemed to be exceeding expectations in terms of intervention performance. The NORC team made final decisions about follow-up site visits in late 2014, in consultation with CMMI and the awardees. For those awardees not selected for a second site visit, we conducted telephone interviews to gather information about the third year of implementation and their plans following the end of HCIA funding.

[11] 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.

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 incorporated 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.

Telephone Interviews

Between March and June 2016, NORC conducted a 60 to 90 minute interview with each awardee that received a no-cost extension, as a type of virtual site visit that supplemented the program documents submitted by the awardees to CMMI as part of HCIA One reporting, and additional primary data collected by NORC (e.g., review of websites, conference posters, publications, unpublished materials shared by the awardee). In these interviews, NORC requested more information about awardee expectations for the NCE period and experiences implementing NCE plans. Impacts of NCE activities on the awardee, partners, and other stakeholders; opportunities and challenges to sustaining, replicating, and/or scaling the innovation; the roles of contextual factors; outcomes for enrollees; and lessons learned, from the vantage point of the NCE period. As with NORC's other interviews, the NCE interviews were recorded and notes prepared for use in analysis; please see Appendix G for more information about protocols for qualitative data collection.

Exhibit 1.8: No-Cost Extension Telephone Interviews, by Awardee

Awardee	Length of No-Cost Extension (NCE), in months	End Date for NCE
DDHS	6	12/31/15
JHU SON	6	12/31/15
LifeLong	6	12/31/15
CLTCEC	7	2/30/16
UEMS	7	1/31/16
PRHI	8	2/30/16
CKRI	12	6/30/16
J-CHiP	12	6/30/16
Northland	12	6/30/16
PCCSB	12	6/30/16
St. Francis	12	6/30/16
UAMS	12	6/30/16
U New Mexico	12	6/30/16
UT Houston	12	6/30/16

Data Analysis

We organized, reduced, and analyzed data collected through interviews, site visit observations, and focus groups using a hybrid approach, including (1) systematic, theme-based coding and (2) rapid cycle completion of structured, theme-based templates. Given the relatively short time frames for gathering and processing qualitative data, this approach allowed our team to quickly organize and assess notes; in addition, the overlapping approaches to identifying and synthesizing themes allows for triangulation of analyses, improving both reliability and validity.

- **Theme-based coding.** We systematically coded data using a codebook based on the HCIA meta-evaluation conceptual framework that captured the major components of the evaluation of CHRPT awardees related to four code families: program, process, environment, and workforce. Based on coded data, we identified themes across all 23 awardees to better understand potential strengths and challenges and focus our analysis on evaluation domains. Appendix G provides additional information on the coding framework and process. These theme-based analyses form the basis for answering the evaluation's set of core research questions.
- **Theme-based templates.** To conduct analyses for awardee case studies and cross-awardee analyses, we developed a set of template tables covering each major evaluation domain (e.g., workforce training and staffing, implementation experience) and for selected cross-awardee themes (e.g., patient engagement, targeting and recruitment, care planning). NORC's qualitative cohort teams were responsible for completing a set of tables for each of the awardees in their respective cohort (post-acute care, long-term services and supports, specialized), using internal working documents including site visit debriefing memoranda and cleaned notes from site visits and interviews. A lead analyst for each site visit oversaw the process of completing the tables and presenting the theme-based findings for each awardee at a weekly qualitative team meeting attended by all qualitative analysts, as well as representatives from NORC's survey and claims-based analytic teams. The tables were revised in an iterative process, using feedback from the weekly team meeting and supplemented by key word searches of coded data.

Survey Methods

As described in earlier NORC reports to CMMI, we collected and analyzed 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 E more information about our approach to survey data collection, which varies by awardee. As much as possible, survey questions were replicated across awardees, whether in NORC stand-alone or coordinated surveys, to optimize cross-awardee comparisons.

Data collection for all of NORC's directly administered consumer and workforce surveys was completed in February 2016. The awardee chapters that follow present the results of all NORC survey analyses, in summary form where the survey findings have been presented in a previous NORC annual report to CMMI; the full set of survey findings is provided in Appendix F. In addition, we received survey data files from several awardees with whom NORC coordinated survey efforts, as well as survey summary reports from awardees who conducted their own consumer and/or workforce survey. See Exhibit 1.9 for a list of survey data and findings that are part of NORC's evaluation.

Exhibit 1.9: Survey Data and Analyses Included in NORC Third Annual Report

Awardee	Survey Analyses Included in Third Annual Report				Other Survey Data/ Findings Shared with NORC
	Consumer/Caregiver Experience		Workforce Trainee		
	NORC	Awardee	NORC	Awardee	
BIDMC	N/A				
CLTCEC		■		■	
CCNC		■	■		
CKRI	■		N/A		
DDHS		■	N/A		Consumer survey includes NORC items
J-CHiP		■		■	Consumer survey includes NORC items
JHU SON	■		N/A		NORC analysis of awardee survey
LifeLong	■		N/A		
Northland	■		N/A		
PCCSB	■		N/A		
PRHI	N/A		■		
PPMC	N/A		■		
SCRF	■	■	■		
St. Francis	N/A				
Sutter Health		■	■		
UEMS		■	N/A		Consumer survey designed, fielded, and analyzed by University of Colorado
UAMS	N/A		■		External comparison group for survey
U Iowa		■	N/A		NORC analysis of awardee survey
U New Mexico		■		■	
U North Texas	N/A				
URI	N/A				
UT Houston	N/A				
VUMC	N/A				

Mixed Methods Data Analysis

Our mixed methods, convergent evaluation design links our analyses of three different types of data (claims, surveys, and qualitative) that have been developed independently. To prepare the case studies in this report, our cohort teams convened a series of meetings around each awardee, bringing together claims, survey, and qualitative analysts to complete a mixed methods template organized by evaluation domain and subdomain; see Appendix G for more detail.

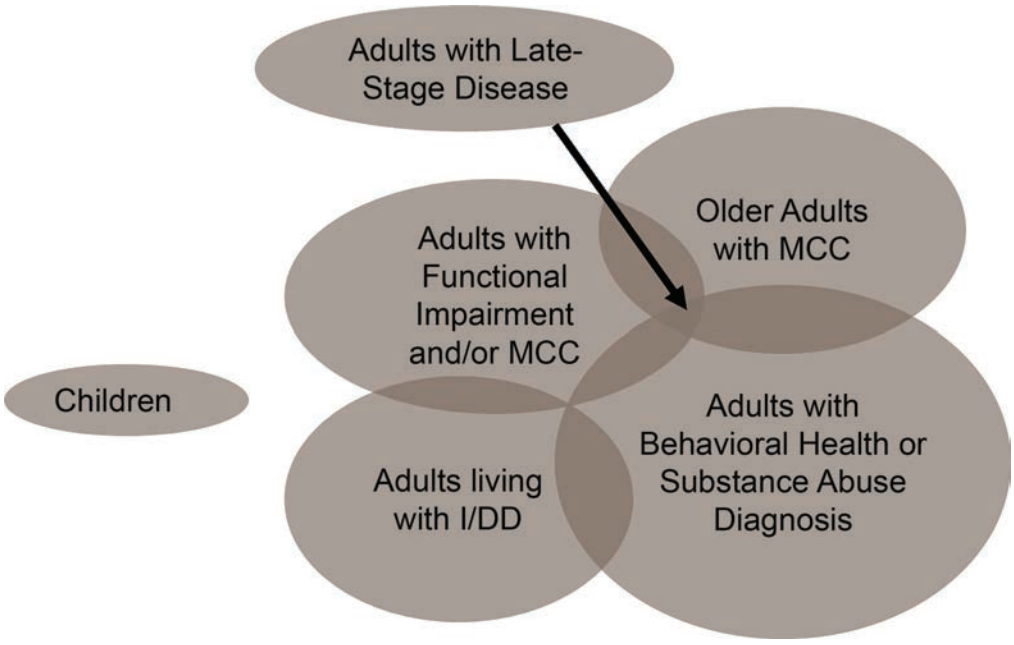
Overview of Awardee Group

NORC's Second Annual Report (2016) provides a detailed review of the Complex/High-Risk Patient Targeting Portfolio awardees as a group, including innovation reach (the numbers of unique beneficiaries served, cumulatively, to date), and demographic characteristics of age range (children ages 0 to 18 years, young adults ages 19 to 25 years, adults ages 25 to 64 years, and older adults ages 65 years and older) and racial and ethnic identity (white, Black or African American, Hispanic or Latino, Asian, and Native American, Pacific Islander, Alaska Native, Native Hawaiian). In addition, in NORC's Second Annual Report to CMMI (2016), we describe the awardees in terms of the extent to which services are delivered

to members of racial and ethnic minority groups, to persons living with a disabling condition, and to persons other than Medicare and Medicaid beneficiaries.[12]

Across the portfolio, HCIA-funded innovations for beneficiaries at high risk for hospitalization target six different groups: older adults, adults living with functional impairment and/or MCC, those with behavioral health or substance abuse disorders, persons living with intellectual and/or developmental disability, adults with late-stage illness, and children living with MCC, often with special needs. See Exhibit 1.10 for a visual summary of awardee targeting. There is overlap among target populations for many awardees, for example, those serving beneficiaries with late-stage disease (PCCSB, Sutter Health, U New Mexico, U North Texas) may also target adults with physical disabilities or multiple chronic conditions (U North Texas), older adults with multiple chronic conditions (PCCSB), and adults with behavioral or substance abuse problems (U New Mexico).

Exhibit 1.10: Beneficiary Populations Served, Complex/High-Risk Patient Targeting Portfolio



I/DD: Intellectual and/or Developmental Disability
MCC: Multiple Chronic Conditions

Program Models

We are evaluating not one model but many, as well as emerging best practices shared across innovations that serve similar, high-risk populations. We classify awardee innovations based on program models and practices being tested or scaled, using a typology based on our evaluation design and an Institute of Medicine typology of models for comprehensive care of persons living with multiple chronic conditions

[12] NORC's Second Annual Report (2016) includes awardee self-reported data through March 31, 2015, covering most innovation enrollees; updated figures are given in this report in the awardee chapter case studies.

(IOM, 2015).[13] See Exhibit 1.11 for a list of these models and practices. There is marked diversity or variation in the scope of how these models are tested, from a clinic serving one metropolitan area to dozens of residential facilities across multiple states or a regional health care system. There are interventions with one arm and those with multiple arms; those piloting a model for the first time and those replicating or scaling an evidence-based program; and ranging in award size from $1.1 million (LifeLong) to nearly $20 million (J-CHiP).

Exhibit 1.11: Program Models and Practices, Complex/High-Risk Patient Targeting Portfolio

Model/Practice	Notes
Advance Care Planning	Includes preparation and/or updating of advance directive, medical orders
Beneficiary/Caregiver Engagement	Outreach by lay health workers
Care/Case Coordination	Facilitation of communication and data-sharing among providers and across care settings
Caregiver Education and Support	Services and supports for unpaid or informal (family) caregivers
Chronic Disease Self-Management	Stanford University evidence-based course
Clinician Decision Supports	Clinical practice guidelines, video-enabled rounds or mentoring
Collaborative Medical Home	Colocation or team that includes community services along with health care (office on aging, social services)
Disability Medical Home	Patient-centered medical home tailored for persons living with an intellectual or developmental disability (I/DD)
Home Health/Home Care	Training personal care aides and/or delivering services in home settings
Independent Living Skills	Classes, workshops, coaching with disability rights perspective
Integrated Care	Colocation or team that delivers primary and specialty care
Patient Navigation	Clinician or lay health worker scheduling of provider appointments, acquisition of durable medical equipment, referrals to community resources and supports
Pharmaceutical Care	Includes clinical pharmacists as part of transitional care team
Transitional Care	Coordination and services delivered immediately before and following discharge from hospital, usually for 30 to 45 days post-discharge
Workforce Training	Classroom, web-based, and/or experiential instruction with competency-based testing of skills and knowledge acquired, behavior change

Assessing Workforce Development

As described in our Evaluation Design Report and Second Annual Report, we take multiple approaches to assessing the efficiency and effectiveness of staffing and training efforts undertaken as part of awardee implementation of HCIA One-supported innovations. Findings from program document review and theme-based analysis of qualitative data (interview, site visit, focus group), together with analysis of NORC and awardee-generated survey data, are linked to answer evaluation questions. In addition, we use the 4-level

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact. What benefits to the organization resulted from the training?

[13] NORC, Evaluation Design Report. HCIA Evaluation –Complex/High-Risk Patient Targeting. Submitted to CMMI, November 15, 2013; Boult C., Murphy, E.K., "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 Academies Press, 2015).

Kirkpatrick Model to create a systematic review of training program effectiveness that enables comparisons across selected awardees.

Rapid Cycle Evaluation: Revising Issues of Feasibility and Evaluability

In NORC's First and Second Annual Reports to CMMI, we characterize several challenges to evaluability faced by NORC and the other front-line evaluators, from the tension between research and quality improvement in how evaluators approach their work to the mechanics of rapid-cycle evaluation. These challenges include access to data and data sharing between awardees and NORC (as CMMI's business agent) and considerations relevant to measuring program effectiveness over time, including identifying a comparison group, distinguishing secular trends (and implications for the validity of performance measures like hospitalization and readmission rates), measuring consumer and informal (unpaid) caregiver satisfaction and experience (especially where an innovation is designed to be invisible to beneficiaries or smoothly integrated into pre-existing clinical processes).

In this section, we revisit these challenges from the perspective of the final months of our evaluation, with attention to the feasibility of rapid-cycle evaluation for innovations that serve medically high-risk groups and limitations on our findings that result from these challenges to evaluability. Three types of challenges have proved to be particularly salient:

- **Analytic Power.** It may be difficult or impossible to secure claims data or to obtain data that are timely, with enough quarters of claims for an adequately powered analysis (particularly for low-prevalence events or for awardees that serve relatively small numbers of beneficiaries), or representative of the mix of payers or demographic characteristics of those served by the innovation.
- **Comparison Group Validity.** As we noted in NORC's First Annual Report to CMMI (2014), several awardees depend upon informal referral networks and clinical judgment to identify participants. Comparison groups based only on claims information cannot mimic these selection factors. Even with NORC's close consultation with each awardee on the process of comparison group creation, there have been significant limitations to our ability to match on beneficiary characteristics such as socioeconomic status (PPMC, U New Mexico, J-CHiP) or patient acuity (Sutter Health). In addition, continuous modification of an innovation, or ongoing refinement of targeting, limits the representativeness of an external comparison group constructed using criteria laid out in the early months of implementation.
- **Meaningful Outcomes Measured Over Appropriate Timeframes.** For awardees that serve persons with MCC, savings in the total cost of care may not be a realistic performance metric by which to judge success, particularly over the relatively short three-year period of performance under HCIA One. For innovations that improve access to care for traditionally underserved groups, for example, an increase in emergency department visits may reflect a desirable gain in access to care, especially in communities where emergency departments have historically served de facto as primary care providers and may be culturally acceptable to beneficiaries as a source of care. Awardee self-monitoring measures may more accurately capture what is most important about a specific innovation, for example, in delaying entrance of a community-dwelling, medically frail beneficiary to skilled nursing or in boosting the completion rate for advance directives. In addition, measuring impact accurately and meaningfully requires acknowledgement of the different timeframes over which change is to be expected, both for each type of measure and for each type of program model

and innovation practice. As we noted in our Second Annual Report to CMMI (2016), early claims-based findings that identify statistically significant impacts at six or 12 months post-enrollment often are no longer significant when measured over 2 years' time.

Exhibit 1.12 provides an overview of the representativeness of claims data available to NORC to date (June 30, 2016), approximating the scope or extent of challenges to evaluability. NORC did not validate awardee self-reported data on payer source. These data are not cumulative (such data are unavailable) but, rather, a snapshot of those beneficiaries served in the most recent HCIA reporting quarter for which awardee self-reported data are available (Q12 for awardees without a no-cost extension; Q12, Q13, or Q14 for those that have been awarded an NCE, depending on the final quarter in which services are delivered). We note the following three challenges to our claims-based analyses and the awardees to whom these challenges are relevant:

- Representative claims data are not available or useable: SCRF (Medicare claims only, representing about one quarter of enrolled beneficiaries); DDHS (no Medicaid claims for beneficiaries enrolled in one of two states where implementing); and CLTCEC (Medicaid managed care health plan data not usable due to limitations including low sample size and lack of usable cost data, revenue codes, and zip codes). Limited Alpha-MAX data also constrains Medicaid analyses for a number of awardees; see Appendix C for more information.
- Fewer than eight quarters (two years) of claims data are available for one or more measures: CLTCEC, DDHS, LifeLong, PCCSB, PPMC, St. Francis, SCRF, and U New Mexico.
- Small analytic sample size (defined as <300 beneficiaries or beneficiary-episodes): CKRI, DDHS (Medicaid), JHU SON, LifeLong, PPMC New Directions program, St. Francis, SCRF, UT Houston.

Exhibit 1.12: Challenges to Evaluability: Representativeness of Claims Data, By Awardee

Awardee	Evaluation Design (H=Hospital, C=Community)	Awardee Self-Reported Data[§]					NORC Analysis		
		Payers (%)			Reach (n)	Report to CMMI	Claims Data	Quarters of Claims Data[§§]	Analytic Sample Size[§§§]
		Medicare	Medicaid	Both (Dually-Eligible)					
BIDMC	H	71	0	29	2,413	Q12	Medicare	11	4,038
CLTCEC	C	16	21	24	6,598	Q14	Medicare	7-8	1,020
CCNC	C	0	100	N/A	15,898	Q12	N/A		
CKRI	C	23	19	39	143	Q14	Medicare	9	66
							Medicaid	8	136
DDHS	C	4	46	48	514	Q14	Medicare	7-10	349
							Medicaid	5	104
J-CHiP	H	35	24	6	80,257	Q12	Medicare	8	26,144
							Medicaid	8	13,745
	C						Medicare	9	2,126
							Medicaid	8	2,511
JHU SON	C	0	0	100	258	Q13	Medicare	8-10	172
							Medicaid	8	207
LifeLong	C	2	68	30	317	Q12	MediCal	4-8	225
Northland	C	85	1	10	913	Q15	Medicare	9-10	562
PCCSB	C	1	0.3	13	1,658	Q15	Medicare	4-10	1,112
PRHI	H	30	10	10	7,689	Q14	Medicare	9	5,158
PPMC	C (HRP)	0	69	19	15,421	Q12	Medicaid	3-4	607
	C (New Directions)						Medicaid		98
	C (ED Guides)						Medicaid		1,503
	C (Standard Transitions)						Medicaid		309
	C (C-TRAIN)						Medicaid		226
St. Francis	H	36	16	1	1,803	Q15	Medicare	10-11	145
	C						Medicare	7-8	252
SCRF	C	1	17	73	673	Q12	Medicare	7-8	172
Sutter Health	C (EOL)	62	7	9	9,406	Q12	Medicare	13	3,339
UEMS	C	0	100	0	4,315	Q13	Medicaid	8	839
UAMS	N/A								
U Iowa	C	8	9	8	2,032	Q12	Medicare	8	924
U New Mexico	C	0	100	0	746	Q15	Medicaid	5-7	553
U North	H (SNF)	data not available				Q12	Medicare	10	6,828

Awardee	Evaluation Design (H=Hospital, C=Community)	Awardee Self-Reported Data[§]					NORC Analysis		
		Payers (%)			Reach (n)	Report to CMMI	Claims Data	Quarters of Claims Data[§§]	Analytic Sample Size[§§§]
		Medicare	Medicaid	Both (Dually-Eligible)					
Texas	C(AL/MC)						Medicare	8	1,473
URI	C	2	5	98	347	Q13	Medicare	10	305
UT Houston	C	0	89	0	317	Q12	Medicaid	18	156
VUMC	H	100	0	0	1,691	Q12	Medicare	9-10	877

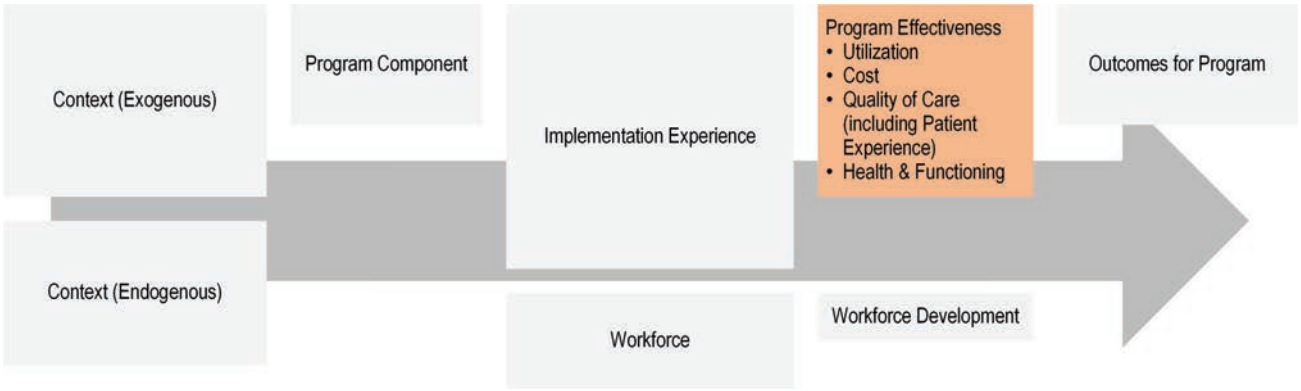
NOTES: Subgroup analyses are included only if the primary analysis for an awardee. Shaded cells indicate fewer than 8 quarters of claims data or analytic sample size <300 beneficiary-episodes or beneficiaries. [§]Awardee's self-reported data to CMMI, for most recent quarter in which services delivered to beneficiaries (through HCIA Reporting Quarter 14). [§§]Number of quarters may vary by measure. [§§§]Unit is beneficiary-episodes for hospital design and beneficiaries for community design.

Awardee-Level Analyses: Overview

Four years after the launch of the Health Care Innovation Award One projects, what can we conclude about program effectiveness in targeting and delivering services to medically complex beneficiaries, especially in terms of the CMMI core metrics of total cost of care, utilization, and quality of care? This chapter offers a summary of the claims-based analyses presented in the 23 awardee case studies that follow, as well as a brief overview of the contents of each case study.

This chapter presents a summary guide to the set of 23 awardee case studies that follow, as well as an overall assessment of program effectiveness across the complex/high-risk patient targeting portfolio, based on claims; see Exhibit 2.1 for a summary visual depiction of our evaluation conceptual framework, highlighting the domain of program effectiveness. Data from each awardee's most recent quarterly report to CMMI were used in drafting this report.[14] Information presented in the following pages varies by awardee, depending on the evaluation activities completed; see Exhibit 2.2 for a summary by awardee. Each awardee case study includes a one page summary overview, an overview of the intervention, presentation of summative findings based on claims, survey, and qualitative data, brief updates on the topics of workforce development, changes in innovation context since NORC's Second Annual Report to CMMI (2016), and prospects for sustaining, replicating, and scaling the awardee's innovation.

Exhibit 2.1: Program Effectiveness: A Visual Guide



[14] For awardees that did not receive a no-cost extension, the most recent quarterly report to CMMI is for HCIA reporting quarter 12 (time period from April 1 through June 30, 2015). For awardees that have received a no-cost extension, the most recent quarterly report to CMMI may be for HCIA reporting quarter 13, 14, or 15.

Exhibit 2.2: Summary, Awardee Chapter Contents for NORC Third Annual Report

Awardee	No-Cost Extension?	Program Model	Claims-Based Findings						Survey Findings	
			Evaluation Design§	Data		Difference-in-Differences/ Comparison Group		Subgroup Analyses	Consumer/ Caregiver	Workforce Trainee
				Medicare	Medicaid	Propensity Score (PS) Matching	PS Weights (Standard Mortality Ratio, Relative)			
BIDMC		Transitional Care	H	■			■		N/A	
CLTCEC	■	Train Home Care Workers	C	■		■			■	■
			C (2nd year)			■				
CCNC		Pediatric Integrated Care Delivery, Clinical Decision Supports	C		■	N/A				■
CKRI	■	Integrated Care Delivery	C	■		■			■	
					■	■				
DDHS	■	Disability Medical Home	C	■		■			■	
					■	■				
J-CHiP	■	Transitional Care, Integrated Care Delivery, Care Coordination	H	■			■	Discharge to SNF	■	■
					■		■	■ Discharge to SNF ■ Dually-eligible Beneficiaries		
		Care Coordination, Outreach, Patient Navigation	C	■		■		Program and Dose		
					■	■		■ Program and Dose ■ Dually-eligible Beneficiaries		
JHU SON	■	Home Care	C	■		■			■	
					■	■				
LifeLong	■	Care Coordination, Independent Living Skills, Patient Navigation	C (1st year)		■	■			■	
			C (2nd year)		■	■				
Northland	■	Care Coordination	C	■		■			■	

Awardee	No-Cost Extension?	Program Model	Claims-Based Findings						Survey Findings	
			Evaluation Design[§]	Data		Difference-in-Differences/ Comparison Group		Subgroup Analyses	Consumer/ Caregiver	Workforce Trainee
				Medicare	Medicaid	Propensity Score (PS) Matching	PS Weights (Standard Mortality Ratio, Relative)			
PCCSB	■	ED Diversion, Advance Care Planning	C	■		■			■	
PRHI	■	Transitional Care, Patient Engagement, Pharmacy	H	■			■	Stratified by diagnosis: AMI, CHF, COPD		■
			H (180 days post-enroll)							
PPMC		Health Resilience Program	C		■	■				■
		New Directions								
		ED Guides								
		Standard Transitions								
		C-TRAIN								
St. Francis	■	Transitional Care, Telemonitoring	H	■			■		N/A	
		Telemonitoring	C			■				
SCRF		Home Care	C	■		■			■	■
Sutter Health		Transitional Care, Advance Care Planning	C (End of Life)	■		■		Living beneficiaries (1-year and 2-years post-enrollment)		■
UEMS	■	ED Diversion, Patient Engagement, Patient Navigation	C		■	■			■	
UAMS		Traing Home Care Workers	N/A							■
U Iowa		Transitional Care	H	■			■		■	
U New Mexico	■	Integrated Care Delivery, Clinician Decision Supports	C		■	■			■	

Awardee	No-Cost Extension?	Program Model	Claims-Based Findings						Survey Findings	
			Evaluation Design§	Data		Difference-in-Differences/ Comparison Group		Subgroup Analyses	Consumer/ Caregiver	Workforce Trainee
				Medicare	Medicaid	Propensity Score (PS) Matching	PS Weights (Standard Mortality Ratio, Relative)			
U North Texas		Transitional Care, Care Coordination	H (SNF)	■			■		N/A	
			C (AL/MC)			■		End of Life		
URI		Disability Medical Home	C	■		■			N/A	
UT Houston	■	Pediatric Integrated Care Delivery, Care Coordination, Navigation	H (Enrollment Phase 1)		■			Phases of Enrollment	N/A	
VUMC		Transitional Care	H	■			■		N/A	
			C	■		■		■ Stratified by Diagnosis (Geriatric Syndrome symptoms) ■ End of Life		

Outcomes: Program Effectiveness

NORC's evaluation considers a range of program effectiveness outcomes (e.g., cost, utilization, quality of care, beneficiary health, functioning, and wellbeing). Our summative findings draw primarily upon Medicare and Medicaid claims-based estimates of impact, related to the total cost of care, utilization, and quality of care for each awardee's innovation, as well as observations across pairs and groups of awardees. The total cost of care reflects Medicare and Medicaid claims only and does not include the cost of the intervention. In addition, findings from surveys and qualitative data enhance our understanding of quality of care. Success for an awardee's innovation or intervention arm reflects savings in the total cost of care that achieve statistical significance, strengthened when accompanied by one or more improvements in utilization and/or the quality of care. Conversely, program effectiveness is also indicated by improved utilization and/or quality of care where there is no statistically significant increase in the total cost of care.

Cost of Care (Claims-based Findings)

Total Cost of Care Per Awardee. Among the 20 awardees for whom claims cost data is available, ten demonstrate statistically significant cost savings, relative to a comparison group, for at least one arm of their interventions.[15] Average quarterly cost savings range from -$381 (PPMC, ED Guides) to -$5,657 (Sutter Health) per beneficiary. See Exhibit 2.3 for a summary table of findings for the total cost of care, based on Medicare or Medicaid claims data as noted, and Exhibit 2.4 for a visual depiction of estimated cost savings and losses that reach statistical significance, with 90 percent confidence intervals for each estimate. Thirteen intervention or intervention arms have average quarterly cost savings of no more than approximately -$2,000 per beneficiary (community arm) or beneficiary-episode (hospital arm). One awardee (CLTCEC) has both cost savings and losses, depending on the enrollment period included in the analysis, and one awardee (URI) shows statistically significant average quarterly losses of $2,360 per beneficiary.

Aggregate Cost Savings or Loss Per Awardee. Another way to assess impact is to consider the scale of innovation, by estimating aggregate cost savings or loss that account for the number of beneficiaries served, the mean number of calendar quarters over which beneficiaries are enrolled, and the average quarterly impact on total cost of care; see Exhibit 2.3 for a summary table that includes these aggregate estimates and Exhibit 2.5 for a visual depiction of aggregate savings and losses. Considering the scope of an awardee's innovation gives us another way to gauge impact, as there are many smaller scale innovations within the complex/high risk portfolio whose impact is likely to be more modest than innovations piloted by health care systems or corporations whose interventions have the potential to touch thousands or tens of thousands of beneficiaries. As above, there are interventions or intervention arms with aggregate savings in the total cost of care, ranging from -$281,791 (PPMC, New Directions) to -$68,541,307 (J-CHiP community arm, Medicaid dollars). Twelve have aggregate cost savings of under -$10 million, two (Sutter Health; J-CHiP community arm, Medicaid dollars) have cost savings between -$15 million and -$25 million, and J-CHiP's hospital arm has the largest estimated cost savings, in both Medicare and Medicaid dollars.

[15] Claims data on cost are not available for CCNC, LifeLong, and UAMS.

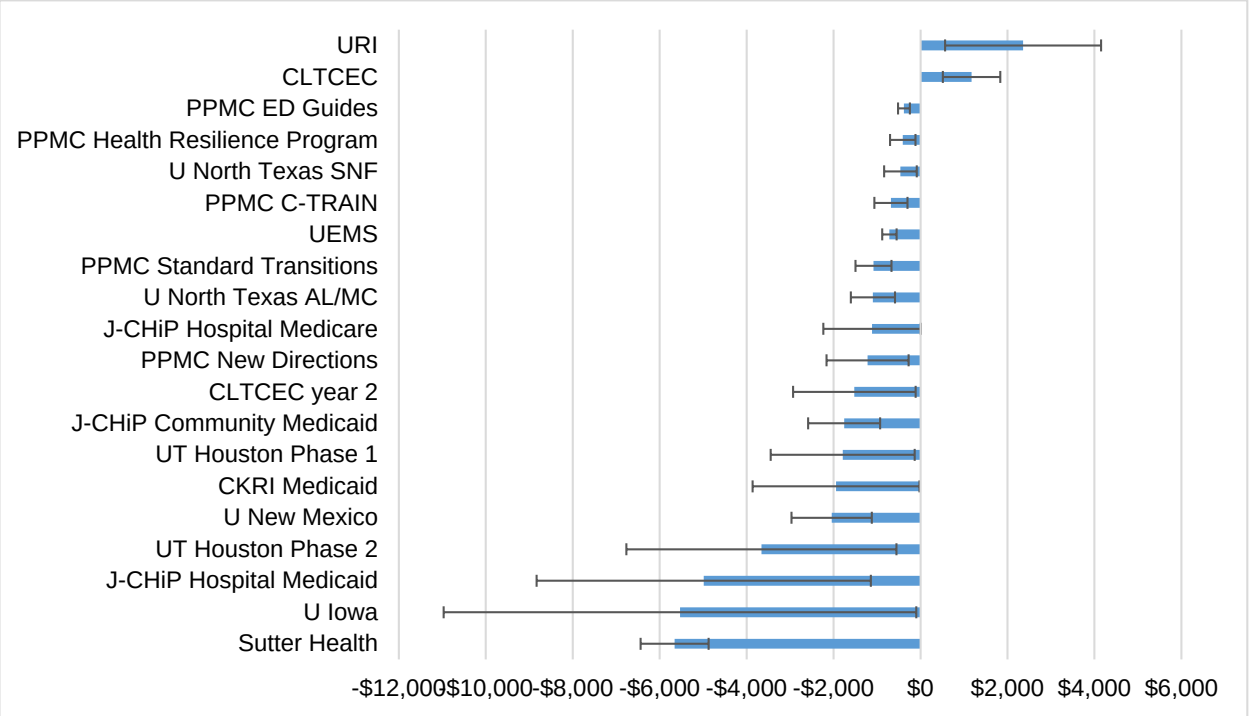
Exhibit 2.3: Cost Effects Associated with HCIA One Interventions, by Awardee

Awardee	Program Model	Evaluation Design§§§§	Data		Average Quarterly Cost§		Aggregate Impact		
			Medicare	Medicaid	Estimate	90% Confidence Interval	Number Enrolled	Mean Quarters of Enrollment§§	Total Cost of Care
BIDMC	Transitional Care	H	■		$825	[-$958, $2,608]	4,038	11.0	$3,332,850
CLTCEC	Train Home Care Workers (1 st year)	C	■		**$1,175 *****	[$515, $1,835]	1,020	3.6	**$4,301,627*****
	2nd year				**-$1,522 ***	[-$2,931, -$113]	268	2.6	**-$960,610***
CKRI	Integrated Care Delivery	C	■		-$468	[-$2,585, $1,649]	66	7.1	-$189,202
				■	**-$1,943 ***	**[-$3,862, -$24]**	136	7.1	**-$1,696,476***
DDHS	Disability Medical Home	C	■		$320	[-$190, $830]	349	6.7	$738,047
				■	$1,982	[-$4,303, $8,267]	104	3.9	$693,719
J-CHiP	Transitional Care, Care Coordination	H	■		**-$1,115 ***	**[-$2,236, $0]**	26,114	8.0	**-$29,153,336***
				■	**-$4,987 *****	**[-$6,909, -$3,065]**	13,745	8.0	**$ -68,541,307*****
	Care Coordination	C	■		-$495	[$ -1,109, $119]	2,126	9.0	-$4,872,064
				■	**-$1,756 *****	**[$ -2,584, -$928]**	2,511	8.0	**-$24,715,159*****
JHU SON	Home Care	C	■		$93	[-$1,076, $1,262]	172	7.2	$108,576
				■	$403	[-$443, $1,249]	207	7.5	$565,688
LifeLong	Care Coordination, Independent Living Skills	C		■			225		
Northland	Care Coordination	C	■		$148	[-$365, $661]	562	5.2	$433,853
PCCSB	ED Diversion, ACP	C	■		-$316	[-$745, $113]	1,112	5.5	-$1,920,663
PRHI	Transitional Care (90-day)	H	■		-$24	[-$1,385, $1,337]	5,158	9.0	-$122,108
	Transitional Care (180-day)		■		-$1,732	[-$3,898, $434]	5,158	9.0	-$8,931,162
PPMC	Health Resilience Program	C		■	**-$408 **	**[-$700, -$115]**	607	2.4	**-$600,854****
	New Directions			■	**-$1,220 **	**[-$2,164, -$276]**	98	2.4	**-$281,791****
	ED Guides (ED Diversion)			■	**-$381 *****	**[-$516, -$246]**	1,503	2.2	**-$1,273,740*****
	Standard Transitions			■	**-$1,081 *****	**[-$1,495, -$667]**	309	1.7	**-$578,241*****
	C-TRAIN			■	**-$681 *****	**[-$1,061, -$302]**	226	2.0	**-$305,968*****

Awardee	Program Model	Evaluation Design[§§§§]	Data		Average Quarterly Cost[§]		Aggregate Impact		
			Medicare	Medicaid	Estimate	90% Confidence Interval	Number Enrolled	Mean Quarters of Enrollment[§§]	Total Cost of Care
St. Francis	Transitional Care, Telemonitoring	H	■		$805	[-$5,651, $7,261]	145	11	$116,725
	Telemonitoring	C	■		-$861	[-$2,239, $517]	252	3.7	-$793,601
SCRF	Home Care	C	■		$129	[-$894, $1,152]	172	5.6	$118,249
Sutter Health[§§§§§]	Transitional Care, ACP	C (EOL)	■		**-$5,657 *** **	**[-$6,440, -$4,874]**	3,339		**-$18,888,723*****
UEMS	ED Diversion	C		■	**-$717 *** **	**[-$883, -$550]**	839	4.4	**-$2,647,775*****
U Iowa	Transitional Care	H	■		**-$5,533 ***	**[-$10,968, -$98]**	380	8.0	**-$2,102,365***
U New Mexico	Integrated Care	C		■	**-$2,044 *** **	**[-$2,968, -$1,120]**	553	5.0	**-$4,889,750*****
U North Texas	Transitional Care (30-day)	H (SNF)	■		**-$449 ** **	**[-$817, -$81]**	6,828	10.0	**-$3,067,186****
	Transitional Care (90-day)		■		-$567	[-$1,293, $159]	6,828	10.0	-$3,873,804
	Care Coordination	C (AL/MC)	■		**-$1,095 *** **	**[-$1,603, -$587]**	1,473	11.0	**-$5,419,635*****
URI	Disability Medical Home	C	■		**$2,360 ** **	**[$566, $4,154]**	305	10.0	**$6,136,229****
UT Houston[§§§]	Phase 1 of Intervention	C		■	**-$1,790 ***	**[-$3,445, -$135]**			
	Phase 2 of Intervention			■	**-$3,649 ***	**[-$6,755, -$543]**			
VUMC	Transitional Care	H (SNF)	■		$29	[-$1,486, $1,544]	877	10.0	$24,183

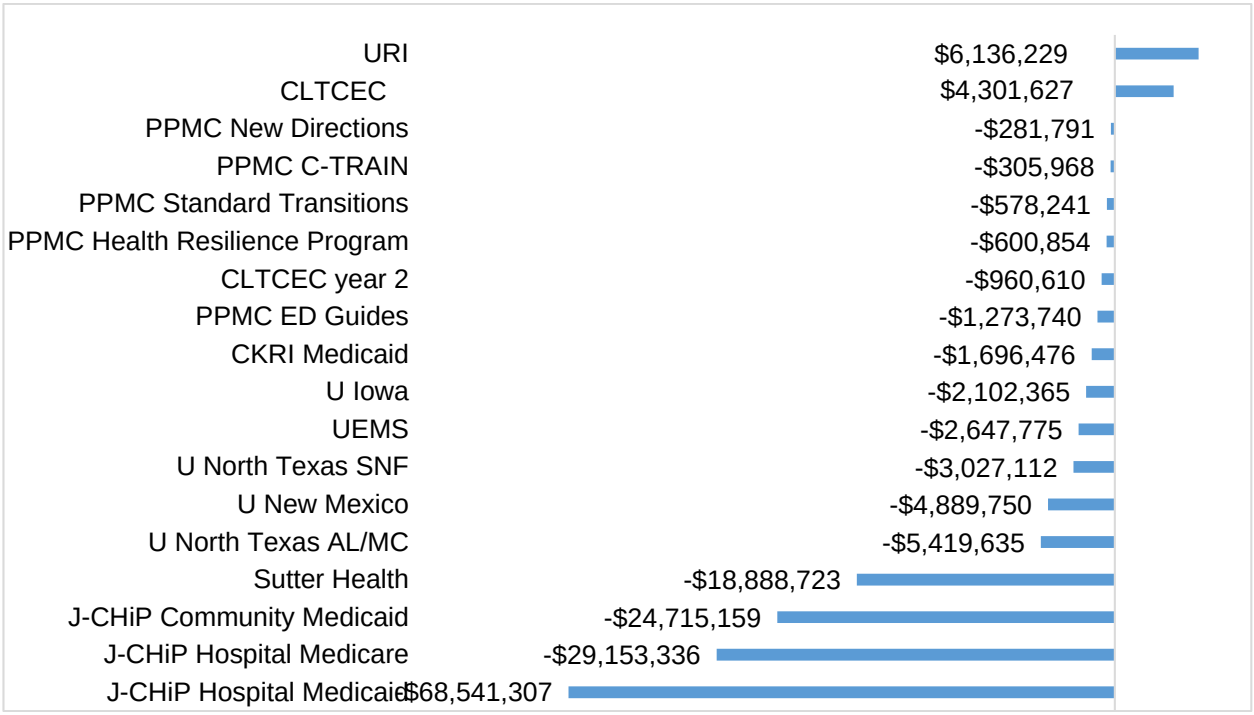
NOTES: *p<0.10, **p<0.05, ***p<0.010. **BOLD font** indicates statistical significance at the p<0.10 level or greater. AL/MC = assisted living.memory care, ED = emergency department, EOL = end of life, SNF = skilled nursing facilities. §Units are per beneficiary-episode for hospital design and per beneficiary for community design. [§§]Calculation of mean length of enrollment is based on finder files that may extend beyond June 20, 2015, for selected awardees with a no-cost extension; the estimated total cost of care is based on analysis of claims for a period that may extend beyond June 30, 2015. [§§§] Cost of care measure for UT Houston is for selected costs of care (outpatient clinic and hospital), reflecting scope of potential impact of intervention, rather than total cost of care. [§§§§] Evaluation Designs include Hospital (H) and Community (C). [§§§§§] Primary analysis for Sutter Health is for beneficiaries in the last 30 days of life and is a differences (time-series) rather than DID analysis; our DID analysis of the experiences of all beneficiaries over the full performance period does not reliably model the intervention's impacts, due to the inability to construct a comparison group with similar life trajectories, and is included in Appendix D.

Exhibit 2.4: Average Quarterly Total Cost of Care, by Awardee



NOTES: Average quarterly total cost of care (savings or loss) are in dollars per beneficiary-episode (hospital evaluation design) or per beneficiary (community evaluation design). Bars indicate average quarterly cost (statistically significant at the p<0.10 level) and black lines represent 90 percent confidence intervals around each estimate for total cost; 90 percent confidence interval may cross zero and still reach statistical significance.

Exhibit 2.5 Aggregate Total Cost of Care, by Awardee



NOTES: Aggregate cost savings for J-CHiP Hospital arm (Medicaid claims) is not shown to scale, to allow visualization of full range of estimates across portfolio of awardees. Aggregate cost savings are not presented for UT Houston due to methodological limits of analysis.

Health Services Utilization and Quality of Care

Exhibit 2.6 displays summary findings for claims-based estimates of hospitalizations, emergency department (ED) visits, hospital readmissions, and quality of care measures, based on Medicare or Medicaid data as noted.

Hospitalizations. Among eight of 21 awardees for whom claims data are available, there are statistically significant decreases in hospitalizations for at least one intervention arm, with average quarterly impacts ranging from -15 to -148 hospitalizations per 1,000 beneficiaries. One awardee (J-CHiP) has both an increase in hospitalizations (hospital arm) and decrease (community arm).

Emergency Department (ED) Visits. Ten awardees show significant decreases in ED visits for at least one intervention arm, with average quarterly impacts ranging from -16 (J-CHiP community Medicare) to -162 (PPMC, New Directions arm) ED visits per 1,000 beneficiaries. Three interventions have an increase in ED visits per quarter: Northland (23 per 1,000 beneficiaries), Sutter Health (28 per 1,000 beneficiaries), and PPMC's ED Guides Program (60 per 1,000 beneficiaries) and Standard Transitions Program (154 per 1,000 beneficiaries).

Readmissions. Of the 14 awardees for whom 30-day hospital readmissions may be measured, two show decreases : the J-CHiP community arm (Medicaid analysis) (-36 per 1,000 beneficiaries) and U North Texas's assisted living/memory care arm (-336 per 1,000 beneficiaries). Two awardees show increases in 30-day readmissions: J-CHiP's hospital arm (14 per 1,000 beneficiary-episodes; Medicare analysis) and SCRF (112 per 1,000 beneficiaries).

Quality of Care.

- *Ambulatory Care-Sensitive (ACS) Hospitalizations.* One awardee (U North Texas, assisted living/memory care arm) shows a quarterly decrease of 6 per 1,000 beneficiaries.
- *Practitioner Follow-Up Visits.* With respect to this measure of access to care, four interventions show increases in practitioner follow-up post-discharge from an acute care hospital: PRHI has an increase in 7-day follow-up visits per quarter (68 per 1,000 beneficiary-episodes). Increases in 30-day follow-up visits are demonstrated for BIDMC (23 per 1,000 beneficiary-episodes), PRHI (33 per 1,000 beneficiary-episodes), VUMC (58 per 1,000 beneficiary-episodes), and U Iowa (85 per 1,000 beneficiary-episodes).

Exhibit 2.6: Utilization and Quality of Care Effects Associated with HCIA One Interventions, by Awardee

Awardee	Evaluation Design	Data		Average Quarterly Impact							
				Hospitalizations		ED Visits		30-day Readmissions		Quality of Care	
		Medicare	Medicaid	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval
BIDMC	H	■		1	[-19, 21]	20	[-3, 43]	-8	[-21, 5]	7-day PFU: 12	[-7, 31]
										30-day PFU: 23**	**[7, 39]**
CLTCEC	C (1st year)	■		37	[-15, 89]	-29	[-73, 15]	10	[-10, 30]	ACS: 83	[-1,167]
	C (2nd year)	■				**-44*****	**[-61,-27]**				
CKRI	C	■		21	[-35, 77]	10	[-46, 66]				
			■	-18	[-56, 20]	29	[-19, 77]				
DDHS	C	■		8	[-12, 28]	0	[-27, 27]	48	[-45, 141]	ACS: 0	[-5, 5]
			■	-21	[-53, 11]	**-57****	**[-102, -12]**				
J-CHiP	H	■		**11***	**[0,22]**	-10	[-21, 1]	**14****	**[4, 24]**	**7-day PFU: -41*****	**[-51, -31]**
										30-day PFU: -29***	**[-40, -18]**
			■	**53****	**[18, 88]**	**-134*****	**[-161, -107]**	6	[-25, 36]	**7-day PFU: -70*****	**[-92, -48]**
										30-day PFU: -184***	**[-212, -156]**
	C	■		**-17*****	**[-27, -7]**	**-16****	**[-26, -6]**	-2	[-31, 27]	ACS: 3	[-4, 10]
			■	**-31*****	**[-39, -23]**	**-48*****	**[-59, -37]**	**-36****	**[-64,-8]**	**PAH: -7*****	**[-11, -3]**
JHU SON	C	■		-5	[-34, 24]	2	[-30, 34]	-71	[-183, 41]	ACS: 7	[-7, 21]
			■	-12	[-28, 4]	-9	[-29, 11]				
LifeLong	C (1st year)		■	-69	[-162, 24]	-26	[-135, 83]				
	C (2nd year)			**-148*****	**[-244, -52]**	**-150*****	**[-259, -41]**				
Northland	C	■		6	[-12, 24]	**23***	**[0, 46]**	-8	[-64, 48]	ACS: 11	[-5, 27]
PCCSB	C	■		**-17*****	**[-25, -9]**	**-24*****	**[-36, -12]**	-5	[-40, 30]	ACS: -2	[-7, 3]
PRHI	H	■		5	[-13, 23]	-11	[-31, 9]	13	[-6, 32]	**7-day PFU: 68*****	**[32, 104]**
										30-day PFU: 33***	**[14, 52]**
	H (180-day)	■		-2	[-22, 18]	**-26***	**[-48, -4]**				
PPMC	C (Health Resilience Program)		■	-19	[-45, 6]	10	[-21, 42]				
	C (New Directions)		■	-51	[-126, 23]	**-162*****	**[-250, -75]**				

Awardee	Evaluation Design	Data		Average Quarterly Impact							
				Hospitalizations		ED Visits		30-day Readmissions		Quality of Care	
		Medicare	Medicaid	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval	Estimate	90% Confidence Interval
	C (ED Guides)		■	**-15*** **	**[-24, -6]**	**60*** **	**[39, 80]**				
	C (Standard Transitions)		■	1	[-93, 95]	**154*** **	**[100, 208]**				
	C (C-TRAIN)		■	-52	[-153, 50]	39	[-19, 97]				
St. Francis	H	■		-16	[-106, 74]	54	[-43, 151]	4	[-64, 72]	7-day PFU: 92	[-15, 199]
										30-day PFU: 26	[-73, 125]
	C	■		25	[-11, 61]	10	[-32, 52]	5	[-76, 86]	ACS: -2	[-27, 23]
SCRF	C	■		20	[-18, 58]	3	[-37, 43]	**112**	**[13, 211]**	ACS: 4	[-16, 24]
Sutter Health[§]	C (EOL)	■		**-71*** **	**[-90, -52]**	**28*** **	**[13, 43]**				
UEMS	C		■	**-15***	**[-31, 0]**	**-143*** **	**[-166, -121]**			7-day PFU: -8	[-24, 39]
										30-day PFU: 7	[-31, 45]
										90-day PFU: -69* **	**[-108, -30]**
										PAH: 2	[-6, 9]
U Iowa	H	■		54	[-20, 128]	22	[-51, 95]	46	[-20, 112]	7-day PFU: 6	[-71, 83]
										30-day PFU: 85 **	**[16, 154]**
U New Mexico	C		■	-16	[-39, 7]	13	[-19, 45]	-39	[-101, 23]	PAH: -9	[-23, 5]
U North Texas	H (SNF)	■		3	[-14, 20]	10	[-5, 25]	-5	[-19, 9]		
	C (AL/MC)	■		**-26*** **	**[-38, -14]**	-5	[-20, 10]	**-336***	**[-629, -43]**	**ACS: -6***	**[-12, 0]**
URI	C	■		2	[-17, 21]	2	[-26, 30]			ACS: 6	[-7, 19]
UT Houston	C (Phase 1)		■	**-36** **	**[-66, -6]**	**-83*** **	**[-119, -47]**				
VUMC	H (SNF)	■		17	[-14, 48]	-11	[-43, 21]	25	[-3, 53]	**30-day PFU: 58*** **	**[43, 73]**
						Count: -70*	**[-136, -4]**				

NOTES: *p<0.10, **p<0.05, ***p<0.010. **BOLD font** indicates statistical significance at the p<0.10 level or greater. Calculation of average length of enrollment is based on finder files that may extend beyond June 20, 2015, for selected awardees with a no-cost extension; the estimated changes in utilization are based on analysis of claims for period that may extend beyond June 30, 2015. PFU = practitioner follow-up visit; EOL = end of life analysis; PAH = potentially avoidable hospitalization; ACS = ambulatory care-sensitive hospitalization' SNF = skilled nursing facilities; AL/MC = assisted living/memory care residence. Count: Measure estimates the number of ED visits within a quarter, rather than the number of beneficiary-episodes with an ED visit in an average quarter. [§]Primary analysis for Sutter Health is for beneficiaries in the last 30 days of life and is a differences (time-series) rather than DID analysis; our DID analysis of the experiences of all beneficiaries over the full performance period does not reliably model the intervention's impacts, due to the inability to construct a comparison group with similar life trajectories, and is included in Appendix D.

Dose or length of enrollment may moderate impact or ability to measure change. NORC's Second Annual Report to CMMI (2016) notes how the outcomes measured may vary with the length of the post-intervention time period over which participants' experience is observed. The number of claims quarters of data for this evaluation, and the three year implementation period, may not match the time period in which impact would be expected. In some cases, short-term cost savings may diminish over time. For example, CLTCEC shows a statistically significant expenditure in total cost of care when estimated over one year (average quarterly loss of $1,175 per beneficiary) and no significant utilization findings. However, in the innovation's second year, there are estimated savings (average quarterly savings of -$1,522 per beneficiary) and a decrease in ED visits (-44 per 1,000 beneficiaries per quarter). For this home-bound, high-risk population, it may take a period of time to stabilize the population before impacts can be realized. LifeLong's impacts are not statistically significant in the first year but show promising reductions in quarterly hospitalizations (-148 per 1,000 beneficiaries) and ED visits per quarter (-150 per 1,000 beneficiaries) that begin in the first year and continue through the period of performance. In contrast, U North Texas's finding of cost savings from its SNF arm at 30-days post-enrollment (average quarterly savings of -$449 per 1,000 beneficiary-episodes) loses significance when measured at 90-days post-enrollment. Similarly, PRHI's congestive heart failure (CHF) enrollees as a group show significant increases in cost and in hospitalizations when measured at 90-days post-discharge, findings that lose significance when measured at 180-days post-discharge.

Impacts may vary by diagnosis or condition within a specific intervention. For PHRI, cost savings across all beneficiaries do not reach statistical significance. Yet, we do find statistically significant savings for beneficiaries with acute myocardial infarction (AMI) (average savings over 180 days of -$7,907 per beneficiary-episode) and, alternatively, increased expenditures for beneficiaries with CHF (average quarterly loss of $2,324 per beneficiary-episode), the latter accompanied by increased hospitalizations per quarter (28 per 1,000 beneficiary-episodes) and readmissions per quarter (30 per 1,000 beneficiary-episodes). In addition, significant reductions in ED visits per quarter are seen for beneficiaries with chronic obstructive pulmonary disease (COPD) but not for those with AMI or CHF.

Savings may be considerable at the end of life. There are statistically significant cost savings for beneficiaries enrolled during their last 30 days of life (average savings of -$861 per beneficiary) and 90 days of life (average savings of -$2,122 per beneficiary) in the U North Texas AL/MC arm and for beneficiaries in the Sutter Health program (average 30-day savings of -$5,657 per beneficiary). VUMC achieved savings for persons enrolled in their last 30 days of life but these did not reach statistical significance.

Beth Israel Deaconess Medical Center

Post-Acute Care Transitions (PACT). PACT 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. 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.

PROGRAM MODELS: Care/Case Coordination, Pharmaceutical Care, Transitional Care

LOCATION: Boston, MA
GRANT: $4,937,191
AWARD DATES: 11/12/12 to 6/30/15
NO-COST EXTENSION: N/A
PAYER(S): Medicare, Medicaid

REACH: 2,413 beneficiaries (97% of target)
POPULATIONS: Adults, Dually Eligible, Urban
DATA: Medicare claims (10/12 to 12/15), site visit (4/14), telephone interviews with leadership (2014 to 2016)

- Coordinated transition of care between large academic medical center and six affiliated partner clinics.
- Services include patient education, medication reconciliation, and referrals to social services.

- CTS, clinical pharmacists, and social workers are located within BIDMC and partner clinics in order to facilitate more effective communication.
- Training takes place over a three-week period, focusing primarily on shadowing existing PACT members.

- BIDMC and partner clinics use a shared EMR that streamlines communication across the partner settings.
- CTS workers are able to adapt PACT processes into existing clinical workflows within each partner site.

OUTCOMES[§§]

- Findings not statistically significant

- Findings not statistically significant

- Increase in 30-day practitioner follow-up visits after hospital discharge [23 per 1,000 beneficiary-episodes per quarter]

SUSTAINABILITY, REPLICABILITY, & SCALING

Intervention will continue as is, with enhancements. 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 it does not have plans to add nurses or pharmacists, BIDMC will hire a MSW, as well as a community resource specialist, to help address the social service needs of high-risk patients.

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 it anticipates may double the number of discharges it serves.

[§§]Outcomes are from analyses that include a comparison group and reach statistical significance at the p<0.10 level.

Overview of Post-Acute Care Transition Program

Background. The Post-Acute Care Transition (PACT) program involves a partnership between the Beth Israel Deaconess Medical Center (BIDMC), a teaching hospital of Harvard Medical School with 672 licensed beds, and six affiliated clinics in the Boston metropolitan area. BIDMC and the six clinics work together to provide improved care coordination and care management services for Medicare Fee-For-Service (FFS) and dually eligible Medicare and Medicaid patients discharged from BIDMC. PACT offers a range of care coordination and care management tasks mostly for older adults (over 75 years of age) including patient education, medication reconciliation, referrals to social services, and communication across providers, facilitated by a medical record shared by BIDMC and the six clinics. Together these six affiliated clinics comprise approximately 30 percent of BIDMC Medicare discharges.

BIDMC notes that the impetus for the intervention came from CMS findings identifying BIDMC as an outlier on 30-day hospital readmissions. First developed as an internally funded pilot, PACT relies on core institutional strengths that BIDMC leadership view as underutilized, especially pharmacy and primary care services. The unique health care environment in the state of Massachusetts— and the Boston region in particular—is a significant consideration in assessing the PACT program. Innovation in this region makes it difficult to isolate the effects of the PACT program from other initiatives at BIDMC and from services that patients may be receiving through other area health care providers. We discuss NORC's effort to isolate the effect of the PACT intervention from the Beth Israel Deaconess Care Organization, a Pioneer accountable care organization (ACO), in greater detail below.

Goals. In addition to the CMMI core performance measures, PACT focuses on increasing patient activation, patient engagement, and treatment compliance (specifically medication compliance) among patients with chronic conditions. PACT is also working to reduce overutilization in the emergency department (ED) by employing community paramedics to conduct house visits to address non-emergent conditions.

Program Models and Practices. The PACT program model focuses on addressing risks that BIDMC identified within its system. These include: 1) system risks, such as lack of integration and poor care coordination efforts; 2) condition-specific risks dealing with chronic conditions and comorbidities; 3) medication management risk related to polypharmacy and medication adherence; and 4) patient-level risks related to low activation and engagement. After identifying these risks, BIDMC used elements from various field-tested care coordination programs[16] to design the PACT intervention.

PACT employs a care team consisting of nurse care transitions specialists (CTSs), clinical pharmacists, and social workers. The work involves 30 to 45 days of follow-up support after discharge from BIDMC. The central member of the team is the CTS, who is responsible for coordinating care between BIDMC and one or more primary care clinics that are part of the PACT program. CTSs are dually located within BIDMC and in one of the partner clinics, which means that they are able to observe patients both pre- and post-discharge.

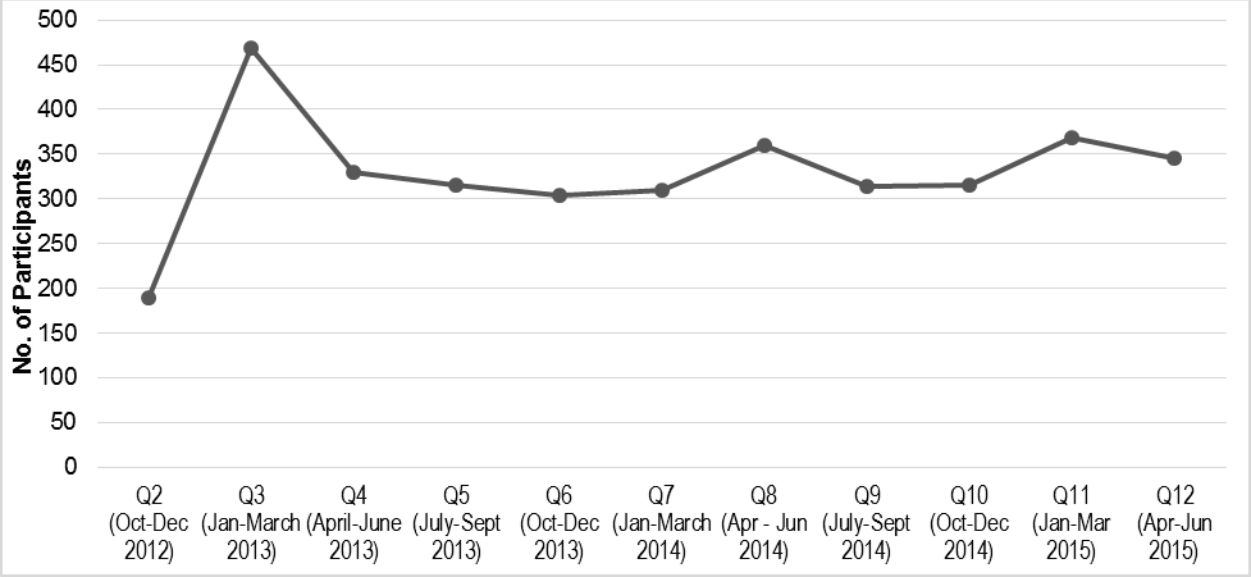
[16] Some of the programs cited include Project BOOST (Society of Hospital Medicine); the COLLABORATE study (Makowsky et al. 2009); the Coleman Care Transitions Intervention; and the Care Management for High Cost Beneficiary Demonstration (Massachusetts General Hospital).

CTSs also coordinate with PACT staff in the hospital, including pharmacists and social workers, to implement the remaining components of the intervention. Pharmacists are responsible for reconciling inpatient and outpatient medication lists in order to send a unified list to the post-acute facility following discharge. Social workers are responsible for coordinating community resources (for example, skilled nursing facilities and other social services), and conducting follow-up calls with the patient to ensure that the patient has enough support post-discharge to continue treatment.

Implementation Updates. Since NORC's Second Annual Report (2016), BIDMC's activities have focused on closing out the HCIA grant period (the program ended on June 30, 2015) and considering options for sustaining the PACT intervention beyond the end of the grant. The awardee noted that BIDMC agreed to continue the program and expand to a larger population (with stratified tiers of patient risk).

Reach and Demographic Profile of Enrolled Beneficiaries. As of June 30, 2015, PACT had served a cumulative total of 2,413 unique direct participants since program launch. Over the course of the three-year grant, enrollment varied between approximately 300 and 370 participants per quarter, following an initial enrollment spike during the third reporting quarter (January 1 through March 31, 2013); see Exhibit BIDMC.1.[17] During the final quarter of HCIA's period of performance (April 1 through June 30, 2015), the program served 346 patients. Participants older than age 75 are the largest group of enrollees (46 percent). Participants aged 65 to 74 years comprise 36 percent of the total, and adults from 26 to 64 years account for 18 percent of enrollees. Slightly over half of enrolled participants are female (56 percent). Most participants are White (67 percent), with the next largest group consisting of those identified as Black or African American (23 percent). Hispanic or Latino enrollees make up 6 percent of the total.

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



[17] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent BIDMC self-reported data available for NORC's AR3 is for HCIA reporting quarter 12, for the time period April 1 through June 30, 2015. For the purposes of this sample chapter, self-reported data are from HCIA reporting quarter 12, as used in NORC's Q9 report.

Summative Findings (Outcomes)

Project PACT improves 30-day practitioner follow-up after hospitalization. The program is not associated with change in total cost of care or utilization of services. Please see Exhibit BIDMC.3 for the full set of claims-based findings.

In the section below, we present our analyses of program effectiveness, based on data from Medicare FFS claims and narrative from NORC interviews and one site visit.

Core and Supplemental Measures

Our analysis compares the experiences of PACT enrollees with those of a weighted comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's PACT program over the implementation period as a whole and in each quarter of program implementation. Our analysis is for Medicare FFS beneficiaries, comprising approximately 71 percent of the PACT targeted participants.[18]

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day Total Cost of Care per beneficiary-episode
- 90-day Hospitalizations
- 90-day ED Visits
- 30-day Readmissions
- 7-day Practitioner Follow-up Visits
- 30-day Practitioner Follow-up Visits

Finder File and Creation of Analytic Sample. BIDMC provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[19] We have identified 4,519 unique beneficiary-episodes in the PACT program, and further limited this number by enrollment date, Medicare identifiers, FFS enrollment status, and the patient's index hospitalization, to yield an analytic sample of 4,038 beneficiary-episodes.

Comparison Group. We use Medicare claims to create an internal comparison group comprising Medicare FFS beneficiary-episodes discharged from BIDMC, but not seen at the six BIDMC-affiliated practices during both the pre- and post-intervention periods.[20] While PACT's finder file allows us to identify beneficiary-episodes for the treatment group in the post-intervention period, we use Medicare claims-based rules to identify beneficiary-episodes for patients discharged from BIDMC that were referred by the same six affiliated practices in the pre-intervention period.[21] We use propensity score weighting (standardized mortality ratio weights) to minimize observed differences in beneficiary-episode characteristics between the BIDMC treatment and comparison groups. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting

[18] Estimated percentage of Medicare FFS participation comes from the awardee's Q12 self-reported data. See Appendix C for more information about our analysis.
[19] Medicare claims for the time period October 1, 2012 through December 31, 2015. We include discharges before June 30, 2015, allowing for 90 day episodes through September 30, 2015 and claims run off through December 31, 2015.
[20] We select the pre-intervention treatment and comparison populations using the inclusion criterion that the beneficiary had an evaluation and management (E&M) visit at BIDMC practices in the one-year period prior to date of hospitalization. This longer time frame for an E&M visit helps to reduce any bias in the pre-intervention group towards patients with worsening conditions.
[21] We only include beneficiaries who were discharged alive after a short-term inpatient stay at BIDMC and exclude beneficiaries admitted to BIDMC and transferred to another inpatient facility.

improves comparability.[22] Using an ACO identification file provided by BIDMC project staff, we also incorporated a fixed effect to control for participation in BIDCO (a Pioneer ACO) or other ACOs, in both the treatment and comparison groups.

Descriptive Characteristics. Exhibit BIDMC.2 displays the descriptive characteristics of beneficiary-episodes (discharges) in the treatment and comparison groups before and after implementation of the intervention. We compare the two groups with respect to demographics, comorbidities, and prior utilization.[23] Beneficiary-episodes attributable to the PACT program are older and more likely to be Black or female. They also have higher morbidity (count of Hierarchical Condition Categories scores); are more likely to be covered by Medicare due to disability; have higher prior utilization (but lower cost post-intervention); and are more likely to be discharged to home health agencies. The proportion of beneficiaries enrolled in Pioneer or Shared Savings ACOs is very low (≤ 2 percent) and is similar between treatment and comparison groups.

Exhibit BIDMC.2 Descriptive Characteristics for PACT and Comparison Group Beneficiary-Episodes

	Pre-Intervention		Post-Intervention	
	BIDMC	**Comparison**	**BIDMC**	**Comparison**
Number of Beneficiary-Episodes	**5689**	**16209**	**4038**	**21127**
Age* % (N)**				
<65 years	26.9 (1530)	21.5 (3485)	22.4 (906)	22.2 (4680)
65-69 years	13.8 (783)	16.6 (2689)	16.1 (650)	17.9 (3774)
70-74 years	12.1 (688)	14.2 (2305)	13.8 (558)	15.6 (3292)
75-79 years	14.3 (816)	14.2 (2299)	14.4 (582)	13.8 (2916)
80-84 years	14.0 (795)	14.0 (2262)	13.2 (535)	12.4 (2625)
≥ 85 years	18.9 (1077)	19.6 (3169)	20.0 (807)	18.2 (3840)
Race/Ethnicity* % (N)**				
White	73.1 (4161)	86.0 (13945)	68.7 (2773)	85.4 (18044)
Black	19.0 (1080)	8.2 (1322)	23.7 (956)	8.1 (1704)
Hispanic	3.3 (185)	1.4 (235)	3.2 (130)	1.5 (317)
Other	4.6 (263)	4.4 (707)	4.4 (179)	5.0 (1062)
Gender* % (N)**				
Female	56.7 (3228)	51.7 (8380)	54.8 (2212)	51.1 (10801)
Hierarchical Condition Categories (HCCs)				
Mean Count of HCCs (Standard Deviation)***	5.8 (3.6)	5.0 (3.3)	5.6 (3.4)	5.4 (3.5)
Mean HCC Score (SD)	3.5 (2.2)	3.1 (2.1)	3.3 (2.0)	3.3 (2.2)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes, unless noted**)**				
Total Medicare Cost (SD) per beneficiary-episode***	$58,014 ($72,044)	$48,727 ($315,762)	$46,046 ($57,743)	$49,492 ($114,962)
Hospitalizations (SD)**	2,294 (3,112)	1,871 (9,312)	1,587 (2,415)	1,708 (4,776)
ED Visits (SD)***	1,651 (3,288)	1,762 (4,689)	1,695 (3,079)	1,930 (4,807)

[22] For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

[23] We test differences between the groups with 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). Comparison is made prior to propensity score weighting.

	Pre-Intervention		Post-Intervention	
	BIDMC	Comparison	BIDMC	Comparison
Coverage Reason* % (N)**				
Age	60.4 (3434)	68.8 (11157)	63.1 (2549)	67.1 (14181)
Disability	36.1 (2055)	28.8 (4669)	33.0 (1333)	30.8 (6509)
End-Stage Renal Disease (ESRD)	0.9 (53)	0.7 (121)	1.6 (63)	0.9 (190)
Disability and ESRD	2.6 (147)	1.6 (262)	2.3 (93)	1.2 (247)
Discharges* % (N)**				
Home	34.0 (1935)	35.4 (5742)	33.1 (1336)	32.7 (6910)
Skilled Nursing Facility	22.3 (1271)	21.4 (3468)	22.3 (902)	24.8 (5244)
Home Health Agency	32.3 (1839)	25.9 (4201)	36.5 (1475)	25.0 (5272)
Hospice	1.2 (69)	1.3 (211)	0.8 (34)	1.6 (340)
Other	10.1 (575)	16.0 (2587)	7.2 (291)	15.9 (3361)
ACO Membership				
Pioneer or Shared Savings	0.4 (20)	0.2 (29)	1.4 (58)	2.0 (418)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of PACT Program. Exhibit BIDMC.3 displays the average quarterly and aggregate impact of the PACT program on its participants relative to the comparison group. We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[24] We find the following, relative to the comparison group:

- **Cost:** A non-significant increase in 90-day cost of care per quarter.
- **Utilization Measures:** A non-significant decrease in 30-day readmissions and non-significant increases in 90-day hospitalizations and 90-day ED visits.
- **Quality of Care Measures:** A significant increase in 30-day practitioner follow-up visits per quarter (23 per 1,000 beneficiary-episodes) but a non-significant increase in 7-day practitioner follow-up.

[24] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit BIDMC.3: Impact of PACT Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiary-episode unless otherwise noted)	**Adjusted Estimate (90% Confidence Interval)**
90-day Total Cost of Care per Beneficiary-episode ($)	$825 [-$958, $2,608]
90-Day Hospitalizations	1 [-19, 21]
90-Day ED Visits	20 [-3, 43]
30-Day Readmissions	-8 [-21, 5]
7-Day Practitioner Follow-up	12 [-7, 31]
30-Day Practitioner Follow-up	**23 [7, 39]****
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care ($)	$3,332,850 [-$3,867,351; $10,533,051]
90-Day Hospitalizations	5 [-76, 86]
90-Day ED Visits	81 [-13, 175]
30-Day Readmissions	-31 [-82, 20]
7-Day Practitioner Follow-up	50 [-28, 128]
30-Day Practitioner Follow-up	**93 [29, 157]****

NOTE: *p<0.10, **p<0.05, ***p<0.01. §Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on total number of program beneficiary-episodes (4,038) and total length of program implementation included in analysis (11 quarters).

Impact of PACT Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact in each intervention implementation quarter are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Workforce Development

Staffing. Since PACT staff is responsible for coordinating care across inpatient, outpatient, and post-acute care settings, PACT leadership expressed a desire from the outset to ensure that PACT processes were efficient and would only minimally disrupt existing clinical operations. First, PACT is designed to require fewer resources than other similar interventions by relying primarily on follow-up care via telephone rather than in-person visits (although some PACT staff do work with the local visiting nurse association to ensure that patients have support in home and community post-discharge). Second, PACT nurses were hired from the inpatient side of BIDMC and brought with them a great deal of familiarity with hospital operations. Many BIDMC staff physicians, even those not in the PACT program, reported to NORC that PACT has had a positive impact on inpatient and outpatient operations.

Further, PACT leadership allows the CTSs flexibility in how they implement PACT within the partner primary care clinics, allowing PACT to be tailored to a clinic's specific workflows. PACT staff reported that cultures and communication preferences vary widely across clinics, with some communicating extensively through hospital electronic medical records (EMR) and others through e-mail or more informal methods. PACT staff reported that adapting to specific communication styles was crucial for success, and

> "[PACT] nurses see patients and they are able to get at some of those barriers, learning about the family and nearest caregivers. I think it has provided a level of service and filled a gap that our clinical nurses don't have a chance to do, given their workload; we do discharge planning, but not at this level."
>
> --BIDMC Provider

most reported that once they were embedded in clinical operations, the primary care staff began to see the value of the PACT program.

Training. PACT trains nurses and clinical pharmacists in post-discharge care coordination and patient activation, including a 200 hour (1 month) classroom-based orientation for nurses and seminars for pharmacists; PACT also runs monthly seminars that provide continuing education for all staff. Orientation focuses on the post-discharge planning process, PACT workflow, and other program-specific details. New PACT employees are also assigned to shadow current PACT staff members. Some CTSs also have the opportunity to shadow visiting nurses and to meet with staff at skilled nursing facilities. Staff is trained in motivational interviewing: they use this technique during telephonic follow-up with discharged patients as well as during in-hospital visits with the patient.

Context: BIDMC In Its Third Year

BIDMC and its partner clinics are affiliated within BIDCO. PACT leadership notes that BIDCO has its own high-risk care manager who performs services similar to those of the CTS. To help remedy this potential duplication of effort, PACT staff has regular conversations with BIDCO care managers to determine how to share in care coordination for the patient, as well as determine whether the patient would be well-served by long-term follow-up by BIDCO staff after exiting the PACT program.

Sustaining and Scaling PACT

The PACT intervention will continue in its current form, with an enhancement: 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. During the course of the program, the PACT team found that a smaller subset of patients have high unmet needs and health care utilization, and that focusing services on these patients would be an efficient use of resources and could lead to substantial improvements in patient health and lower ED utilization. While it does not have plans to add nurses or pharmacists, BIDMC found that social service needs were higher than anticipated among high-risk patients, and as a result BIDMC will hire a social worker and a community resource specialist to help address these needs. BIDMC will also continue to cooperate with BIDCO to determine whether patients in high- or moderate-risk levels will be referred to long-term case management from BIDCO.

With support and investment from BIDMC, the awardee decided in the spring of 2015 to expand the intervention to four other practices, for a total of 10 practices implementing the intervention. Additionally, all Medicare, dually eligible, and a subset of commercial patients from BIDCO will receive PACT services.

Summary

Our claims-based analysis of BIDMC's PACT program shows significant increases in 30-day practitioner follow-up visits in multiple post-intervention quarters. The PACT program does not show any meaningful decreases in cost of care or utilization measures. We conducted additional tests, examining the intensity of use (i.e., counts of hospitalizations and ED visits following each episode), and these results were consistent with conclusions from the binary measures. In addition, we controlled for the likelihood of

enrollment in a Pioneer or Medicare Shared Savings Plan ACO among both treatment and comparison group members, to account for the presence of additional care coordination services that may have been provided by ACOs. We find that only a small fraction (≤ 2 percent) of beneficiaries in either the treatment or comparison population was in an ACO. Moreover, rates of ACO participation were similar across the treatment and comparison group populations. Given the widespread adoption of interventions to improve the quality of care in the vicinity of BIDMC, and the nature of claims data available, it may be that most people in the comparison population are also subject to similar-quality improvement interventions as the BIDMC treatment population.

References

HCIA Supplemental Report for Beth Israel Deaconess Medical Center, for Reporting Quarter End Date 6/30/2013. BIDMC, 2013.

HCIA Narrative Progress Report for Beth Israel Deaconess Medical Center, for Reporting Quarter End Date 7/31/2015. BIDMC, submitted 07/31/2015.

HCIA Quarterly Report for Beth Israel Deaconess Medical Center, for Reporting Quarter End Date 7/31/2015. BIDMC, submitted 08/31/2015.

California Long-Term Care Education Center

Care Team Integration of the Home-Based Workforce. This program trains pairs of MediCal-enrolled consumers and personal home care attendants (PHCAs) employed as providers to California's In-Home Support Services (IHSS) program, in three counties. Objectives include improving communication and care coordination across home and clinical settings, and improving chronic disease management for this dually eligible population.

PROGRAM MODELS: Caregiver Education and Support, Home Health/Home Care, Workforce Training

LOCATION: California (Contra Costa, Los Angeles, and San Bernardino Counties)

GRANT: $11,831,443

AWARD DATES: 7/1/12 to 1/31/16

NO-COST EXTENSION: 7 month, full program

PAYER(S): Medicare, Medicaid

REACH: 6,598 pairs of beneficiaries and IHSS providers (110% of target)§

POPULATIONS: Disability, Dually Eligible, Limited English Proficiency, Racial/Ethnic Minority, Urban

DATA: Medicare claims (1/13 to 3/16); NORC analysis of awardee consumer and workforce trainee surveys; one site visit (2014); telephone interviews with leadership (2014 to 2016)

- PHCAs enrolled in 17-week training series, delivered in multiple locations and languages; consumers attend two sessions
- Recruitment approach shifted from phone-banking to in-person canvassing (in two counties).
- Risk-based selection of consumers offered in Contra Costa County, through health plan

- IHSS providers acquired knowledge and skills related to home caregiving, communication with physicians, and sense of empowerment as a professional

- Implementation partner University of California at San Francisco developed, fielded, and analyzed consumer and trainee survey used for internal monitoring and assessment.
- Collaboration between six health plans and the awardee to acquire claims data was challenged by capitation arrangements in most counties.

OUTCOMES§§

- Increase in total cost of care ($1,175 per beneficiary per quarter)
- Decrease in total cost of care (-$1,522 per beneficiary per quarter) in second year only

- Decrease in emergency department visits (-44 per 1,000 beneficiaries per quarter) in second year only

- 97% of IHSS providers report satisfaction with training
- 94% of IHSS providers report learning new skills and feeling better-prepared to perform their job

- Percentage of consumers reporting excellent, very good, or good health doubled after the training (43% v. 22%).

Analysis limited due to challenges related to using Medicaid claims data.

SUSTAINABILITY, REPLICABILITY, & SCALING

Awardee plans to sustain a smaller-scale version of the HCIA-funded innovation, consisting of three courses offered in English and Spanish in Los Angeles beginning March, 2016.

Initial plan to scale the training through inclusion of a California Section 1115 waiver or new regulations to certify personal care aides has encountered political resistance to making training of IHSS providers mandatory. Instead, CLTCEC has been exploring prospective funding from grants and foundations.

§Target is for initial performance period, through 6/30/2015. §§Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the p<0.10 level. Outcomes for quality of care and health are from NORC analysis of CLTCEC consumer survey data.

Overview of Care Team Integration of the Home-Based Workforce

Background. The Care Team Integration of the Home-Based Workforce is a program designed by the California Long Term Care Education Center (CLTCEC) to improve care coordination across home and clinical settings and facilitate the management of chronic disease in seniors and people with disabilities. The program trains pairs of consumers enrolled in Medi-Cal with their personal and home care attendants (PHCAs) in California's In-Home Support Services (IHSS) program. Initially, CLTCEC planned to work with managed care organizations (MCOs) to identify high-risk consumer participants for the training program based on utilization data. However, due to competing health care reform programs such as the Medicaid Coordinated Care Initiative (CCI), MCOs were unable to devote adequate resources to the CLTCEC program at its inception.

CLTCEC subsequently modified its strategy for identifying potential participants and began to identify consumers indirectly through SEIU Local 2015. SEIU Local 2015 helped the awardee identify providers who work a substantial number of hours a month, indicating that they may work with a high-risk consumer. CLTCEC then contacted providers in order to make contact with their consumers, whom it recruited into the HCIA-supported training program. With their consumers' consent, CLTCEC recruits IHSS providers into the program. This process occurs in Los Angeles County and San Bernardino County. In its first year, CLTCEC recruited participants over the phone. However, this telephone-based strategy proved ineffective in enrolling consumers into the training. CLTCEC then switched to a door-to-door canvassing strategy through a campaign known as the Voice for Better Care Campaign. This process facilitated recruitment and allowed field coordinators to connect personally with consumers.

The Contra Costa County Health Department has the advantage of housing both the county health plan and the IHSS program. This partnership facilitates the exchange of information and the recruitment of consumer/provider pairs for training at this implementation site. Whereas the Los Angeles implementation sites require field coordinators to go door-to-door, Contra Costa social workers from the IHSS plan are the main recruiters into the program. Because these social workers have access to the Contra Costa Health Plan data, they are able to recruit based on the high-risk/risk criteria that CLTCEC originally specified.

Goals. The program has two primary objectives: (1) improving communication and care coordination across home and clinical settings, and (2) improving the management of chronic disease for this dually eligible population in order to reduce ED visits, hospitalizations, and length of stay in skilled nursing facilities. In addition to the core HCIA measures, CLTCEC tracks enrollment rates for pairs recruited, completion rates for providers enrolled, and completion rates for providers who attend at least one class. CLTCEC also collects a number of additional measures via survey, including patient-centeredness, patient satisfaction, personal home care aide (PHCA) job satisfaction, and PHCA comprehension. The program targets two major patient populations: frail elders with multiple chronic conditions and adults (18 years+) with physical disabilities or multiple chronic conditions.

Program Models. CLTCEC's program engages and educates IHSS providers to enrich their background and empower them to become a member of the consumer's care team. IHSS-paid caregivers include professional caregivers as well as family members of those with chronic illnesses or disabilities. The program provides a 17-week training curriculum for IHSS caregivers. Chronic disease management is a

primary goal within the training curriculum. Trainees are taught to encourage self-management techniques in the consumers, especially through two training modules that consumers are invited to attend. Training focuses on disease education, nutritional information, and caregiver safety; it also includes an aspect of reducing caregiver stress and burden, which is facilitated by the group training setting where caregivers may get to know one another. Instructors with medical backgrounds teach the curriculum in multiple languages. Several important revisions have been made to the curriculum, including a reduction in weekly class time and the integration of more adult-learning techniques such as role-playing and hands-on learning. In addition, for consumers unable to participate in the two training modules in-person, awardee staff provided this instruction in their homes.

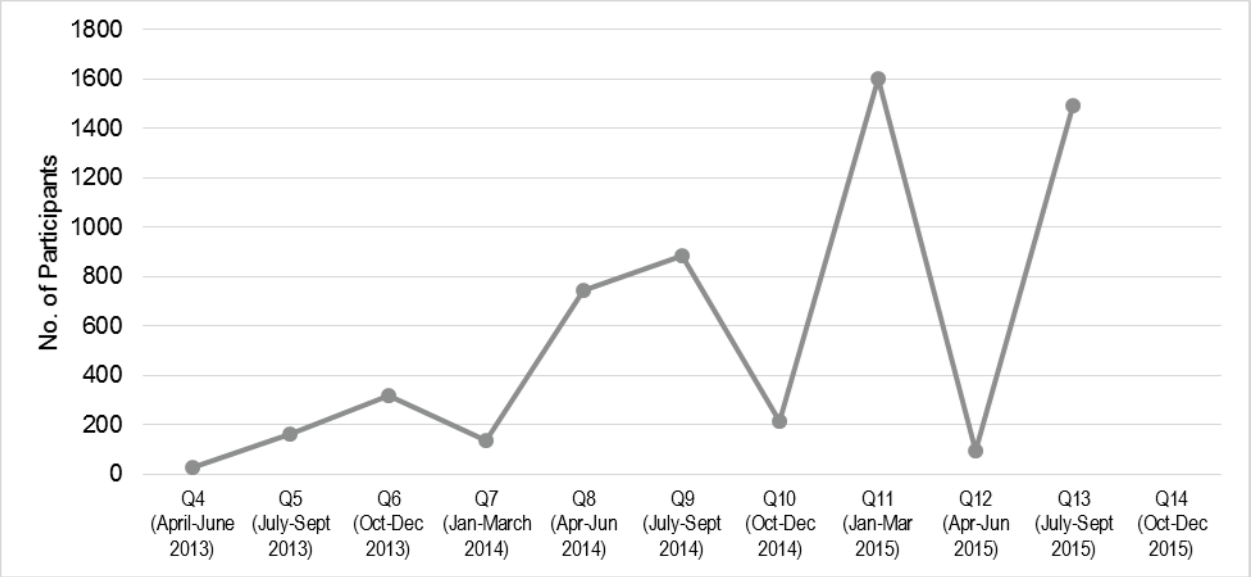
Implementation Updates. CLTCEC's at-home training was offered from January to December 2015, to consumers unable to attend the training in-person. CLTCEC also developed a Level 2 curriculum to expand on its existing training and advance trainees' skills and knowledge. Level 2 focuses on additional skills, more in-depth study of topics from Level 1, and a new topic (oncology). It was developed based on input from stakeholders, partners, and study of health care trends and other curricula. As of this report, Level 2 curriculum had yet to be implemented.

- **Reach, Targeting, & Recruitment.** CLTCEC encountered difficulties with recruitment early on in the program. The original recruitment strategy focusing on phone-banking resulted in very low enrollment. In collaboration with SEIU, CLTCEC changed its recruitment strategy to an in-person canvassing approach based on the zip codes common among provider/consumer pairs. This approach returned a much higher enrollment rate, which was then followed by a focus on referrals and word-of-mouth recognition, including the "fill a seat" program, through which past students could recommend participants for the next session.
- **Dosage.** CLTCEC shortened the number of required hours for its training curriculum.
- **Fidelity and Capacity for Midstream Adaptation.** CLTCEC made several adaptations in response to challenges encountered during implementation and feedback from staff and trainees. The awardee has shown great flexibility and self-reflection, which can be seen in the modification of recruitment strategies and intervention dosage.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 30, 2015, a total of CLTCEC had served a cumulative total of 6,598 IHSS consumer-PHCA pairs since program launch; these included the 6,375 pairs trained over the initial period of program performance (unpublished data from CLTCEC). Enrollment has cycled through the implementation period, growing toward a peak after the start of a training session and diminishing toward the session's conclusion; Exhibit CLTCEC.1 depicts the unduplicated (unique) count of beneficiaries who have completed a course, in each HCIA reporting quarter. The uneven curve reflects limited data to reconcile the differences between the number of beneficiaries completing a course in a given reporting quarter and the number of courses offered during a period of time (235 classes offered over the course of nine calendar quarters in Los Angeles and San Bernardino Counties and 11 classes offered between January 2013 and May 2015 in Contra Costa County). During the most recent quarter for which data are available, the program served 1,495 unique pairs of participants. Of consumers, 61 percent were female. Just under half (46 percent) were age 75 years and older, 19 percent were between the ages of 65 and 74, 29 percent were ages 26 through 64 years, and five percent were young adults ages 19 through 25 years. Hispanics or Latinos comprised the single largest known group of consumers (42 percent), followed by those identified as White (20 percent),

Asian (14 percent), and Black or African American (nine percent). Information on race/ethnicity was unavailable for 13 percent of clients.

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



Summative Findings (Outcomes)

In this chapter, we present our summative findings for program effectiveness, based on analysis of Medicare claims and survey data; findings regarding quality of care and health outcomes drawn from survey and qualitative data; and findings on the topics of workforce development, context, and sustainability, replicability, and scaling, all updated since NORC's second annual report (2016). We also provide an overview of our work with Medicaid data from six health plans.

The CLTCEC program decreases emergency department (ED) visits and cost in the second year after program enrollment, indicating that participants who are enrolled in the program for longer than one year see substantial benefits from program services. We do not observe impacts in the overall models.

Core and Supplemental Measures: Medicare

Our community (ambulatory care) analysis compares the experience of CLTCEC enrollees in the program with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of CLTCEC's innovation over the enrollment period as a whole and in each quarter of enrollment.

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- 30-day Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Our analysis is for Medicare Fee-For-Service (FFS) beneficiaries, comprising 16 percent of all CLTCEC enrollees.[25]

Finder File and Creation of Analytic Sample. CLTCEC provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[26] We identified 2,421 unique beneficiaries, and further limited this number by enrollment date, Medicare identifiers, and chronic conditions, yielding an analytic sample of 1,020 beneficiaries.

Comparison Group. The comparison pool consists of patients in the IHSS program for California whose caregivers did not receive training through the CLTCEC program.[27] We use propensity score matching to find appropriate comparators.[28] The final propensity model includes age, race, gender, disability status, comorbidities, and prior utilization (hospitalizations and ED visits) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[29]

Descriptive Characteristics. Exhibit CLTCEC.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, comorbidities, and prior utilization.[30] We observe no differences in demographics, comorbidities, or prior utilization measures.

[25] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[26] Medicare claims are available through March 31, 2016 for the analysis in this report. We use December 31, 2015, as the cut-off date to account for the 90-day claims runoff.

[27] The mixed quality of identifiers across health plans means that not all health plans are equally represented in this analysis. Of the 5,761 identifiers shared across the six health plans (IEHP, Care1st, ContraCosta, HealthNet, Molina, L.A.Care), we were only able to link and use identifiers for 2,421 patients. Due to the heavy Medicare managed care penetration in California, approximately 50 percent had Medicare FFS during the appropriate time period to be included in the evaluation. As a result, we see the following percentage of each health plan's enrolled beneficiaries represented in our assessment: 100 percent of Care1st enrollees, 40 percent of HealthNet enrollees, 34 percent of L.A. Care enrollees, 3 percent of IEHP enrollees, and zero percent of Contra Costa's enrollees and Molina's enrollees.

[28] For more information on propensity score matching, please refer to Appendix C.

[29] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[30] We test differences between these groups with 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).

Exhibit CLTCEC.2: Descriptive Characteristics for CLTCEC and Comparison Group Beneficiaries

Variable	CLTCEC	Comparison
Number of Beneficiaries	1,020	1,020
Mean Number of Quarters Enrolled [Range]	3.6 [1-9]	3.6 [1-9]
Gender % (N)		
Female	68.2 (696)	67.2 (685)
Age Group % (N)		
<65 years	17.1 (174)	17.5 (179)
65-74 years	17.7 (181)	18.7 (191)
75-84 years	39.4 (402)	37.5 (383)
≥85 years	25.8 (263)	26.2 (267)
Race/Ethnicity % (N)		
White	34.5 (352)	36.0 (367)
Black	6.8 (69)	6.9 (70)
Asian	33.0 (337)	32.2 (328)
Other	25.7 (262)	25.0 (255)
Dual Eligibility % (N)		
Dual Enrolled	99.8 (1,018)	99.5 (1,015)
Coverage Reason % (N)		
Old Age	74.9 (764)	75.0 (765)
Disability	22.5 (229)	22.8 (233)
End-Stage Renal Disease (ESRD)	1.4 (14)	0.9 (9)
Disability and ESRD	1.3 (13)	1.3 (13)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (SD)	1.9 (1.4)	1.9 (1.5)
Mean Count of HCCs (SD)	2.8 (2.7)	2.7 (2.7)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD)	$17,841 ($29,711)	$17,307 ($31,394)
Hospitalizations (SD)	418 (959)	428 (960)
ED Visits (SD)	475 (1,337)	477 (1,380)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of CLTCEC Program: Exhibit CLTCEC.3 displays the average quarterly and aggregate impact of the CLTCEC innovation on its participants relative to the comparison group.[31] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[32] We find the following for the CLTCEC program, relative to the comparison group:

- **Cost:** A statistically significant increase in total quarterly cost of care ($1,175 per beneficiary).
- **Utilization Measures:** A non-significant decrease in ED visits and non-significant increases in hospitalizations and 30-day readmissions.
- **Quality of Care Measures:** A non-significant increase in ambulatory care-sensitive hospitalizations.

[31] Adjustment factors include age category, gender, race/ethnicity, HCC score, and disability indicator.

[32] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

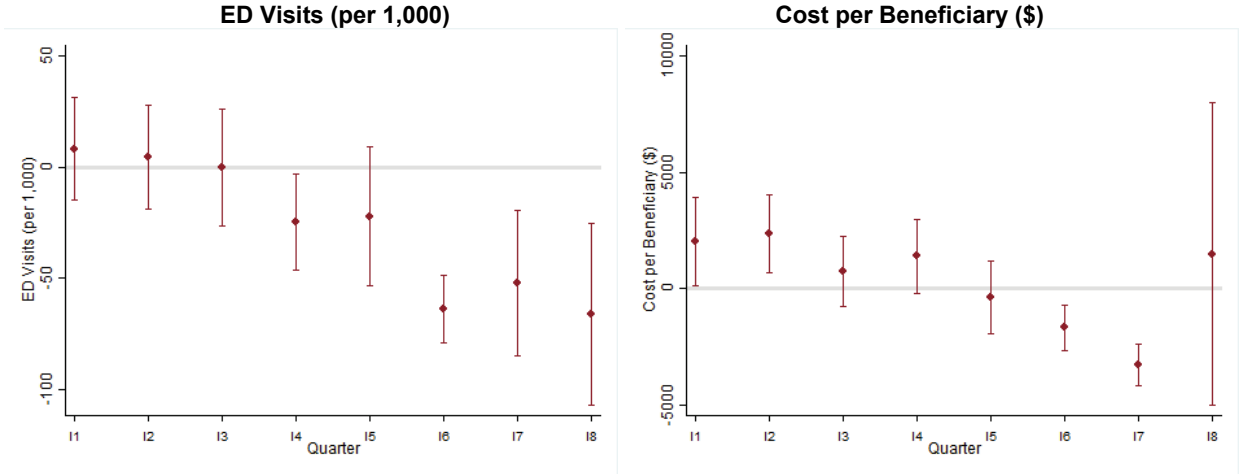
Exhibit CLTCEC.3: Impact of CLTCEC Program on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	**$1,175 [$515; $1,835]*** **
Hospitalizations	37 [-15, 89]
ED Visits	-29 [-73, 15]
30-Day Readmissions	10 [-10, 30]
ACS Hospitalizations	83 [-1, 167]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**$4,301,627 [$1,886,222; $6,717,032]*** **
Hospitalizations	10 [-4, 24]
ED Visits	-8 [-20, 4]
30-Day Readmissions	29 [-32, 90]
ACS Hospitalizations	23 [-1, 46]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (1,020), with an average length of program enrollment of 3.6 quarters, ranging from 1-9 quarters.

With the exception of ED visits and total cost of care, findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Exhibit CLTCEC.4 displays the results of the QFE DID model for ED visits and total cost of care.[33] We observe decreasing trends in both ED visits and total cost of care over the entire post-intervention period, with multiple quarters showing significant decreases for each measure. This decrease seems to be more distinct in the second year of program enrollment (quarters I5 through I8).

Exhibit CLTCEC.4: Impact of CLTCEC Program on Outcomes, by Quarter



[33] See Appendix C for a more detailed explanation of the QFE DID models and measure specification. For utilization and quality of care measures, we display the effect as the average difference (and 90 percent confidence interval) between intervention and comparison per 1,000 beneficiary-episodes for each quarter.

Subgroup Analysis: Impact of CLTCEC Program in Second Year of the Program. Because we observed such a striking decrease in ED visits and cost in the second year after program enrollment, we conduct a sensitivity analysis to investigate overall effects in the second year after enrollment. Exhibit CLTCEC.5 displays the average quarterly and aggregate impact for beneficiaries in the second year after program enrollment. We find the following for the CLTCEC program, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$1,522 per beneficiary).
- **ED Visits:** A significant decrease in ED visits per quarter in the second year after program enrollment (-44 per 1,000 beneficiaries).

Exhibit CLTCEC.5: Impact of CLTCEC Program on Outcomes, Second Year after Program Enrollment

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	**-$1,522 [-$2,931; -$113]***
ED Visits	**-44 [-61, -27]*****
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$960,610 [-$1,849,442; -$71,778]***
ED Visits	**-28 [-39, -17]*****

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (268), with an average length of program enrollment of 2.6 quarters, ranging from 1-4 quarters.

Core and Supplemental Measures: Evaluability Assessment of Medicaid Data

NORC's capacity to use Medicaid claims to evaluate CLTCEC is limited by our lack of complete claims or encounter data. Due to capitation arrangements in the state of California, the Medicaid claims experience captured a limited portion of the claims experience for CLTCEC participants. In an effort to capture a more complete picture, we used the Medicare FFS data summarized above. Exhibit CLTCEC.6 summarizes the data we received from the six health plans serving CLTCEC participants.

Exhibit CLTCEC.6: Overview of Medicaid Data Received from CLTCEC Health Plan Partners

Health Plan Partner	Counties in California	Final File Received	No. of CLTCEC Participants	No. of Comparators
Contra Costa Health Plan	Contra Costa	12/9/2015	122	2,354
Care 1st Health Plan	Los Angeles	1/16/2015	44	19
Inland Empire Health Plan	San Bernardino	8/19/2015	123	47
Molina Healthcare of California Partner Plan, Inc.	Los Angeles	3/9/2016	246	32,260
L.A. Care	Los Angeles	3/11/2016	2,340	83,061
Health Net	Los Angeles	3/9/2016	2,023	63,279

Data challenges in the processing and analysis of these files included the following:

- **Extremely Small Numbers of Inpatient Hospitalizations and ED Visit Claims.** Based on the high-risk population served by CLTCEC, we would expect to see fairly high utilization rates. However, rates of hospitalizations and ED visits are less than 10 percent in all files.
- **Low Numbers of CLTCEC Participants and Comparators Included in the Files.** Numbers of participants in the data files vary widely by plan, with four of the six plans containing less than 300 CLTCEC participants. In addition, because the patient populations are different, we would need to match comparators within each plan; this becomes difficult when there are few comparators. In the case of the Inland Empire Health Plan and Care 1st, there are even fewer comparators than CLTCEC participants.
- **Lack of Usable Cost Data.** Cost data from the health plans are sparse and frequently missing in the files. We heard from one plan that they "don't have any meaningful cost information."
- **Lack of Revenue Codes.** Without revenue codes, we are unable to accurately identify observation stays and quality of care measures such as avoidable hospitalizations.
- **Lack of Zip Codes or Other Geographic Identifiers.** We had planned to use geographic identifiers to better understand where participants and comparators were seeking care; however, most of the files do not include this information. This also limits our ability to match comparators to the participants.

Because of these constraints on Medicaid data usability, we present the Medicare analysis as the primary claims-based analysis for this report, with adequate analytic power to detect statistically significant differences in outcome measures. Despite low utilization rates and poor data quality, our preliminary analyses on the Medicaid data indicates trends similar to those seen with the Medicare data. For QFE graphs from the Medicaid health plan data, please see Appendix D.

Quality of Care and Health (Survey and Qualitative Findings)

Our assessment of CLTCEC's HCIA-funded innovation is based on qualitative data (two site visits and a series of telephone interviews) and on findings from two surveys developed by CLTCEC and fielded with IHSS consumers and IHSS-trained caregivers. The CLTCEC consumer survey, designed by the University of California, San Francisco, measures the impact of the care team integration training on the IHSS provider's integration and involvement in a consumer's care team (from the consumer's perspective), as well as the care delivered to consumers. Consumers completed the survey on paper or via Nook tablets at the beginning and end of the 17-week training. While not a true pre- and post-survey design (e.g., slightly different versions of the survey were administered at the start and end of each training course), items on the survey enable respondents to describe changes during the time period in which the training takes place, allowing analysis that compares responses from baseline with those at post-training follow-up. For this reason, we refer to the data in terms of pre- and post-training in our analysis.

From 2014-2015, 2,618 consumers completed the pre-training consumer survey, and 3,063completed the post-training consumer survey. After excluding observations with unmatched pre- and post-survey data, 1,300 consumer respondents with pre-post matched data were included in this analysis. Detailed consumer survey results may be found in Appendix F.

Consumer Experience. There was little change between pre- and post-survey responses in terms of frequency of communication with a consumer's care team regarding health conditions and well-being, although a majority of consumers had a positive outlook on provider/care team integration after the training. Eighty-seven percent of consumer respondents think that their provider will be able to better communicate with their care team, while less than one percent expect that communication will be worse. Almost all consumers (97 percent) are very confident or confident their provider will be an effective member of their healthcare team, and 71 percent think that their provider will communicate with their care team more often.

At the beginning of training, most consumer respondents (70 percent) report having information on who to contact for health concerns, and 80 percent report obtaining new or additional contact information during the training. After the training, there is a significant decrease in the number of consumer respondents who report their IHSS provider does not communicate with their healthcare team (68 percent pre-survey, 2 percent post-survey), and an additional 187 consumer respondents who report at least some communication in the past month (even if they do not know how many times they communicated with the healthcare team). Both pre- and post-training data show the main reasons for communication include discussing medical equipment (e.g., wheelchair); reporting or discussing blood-sugar levels; and asking for medication refills. While the training may have influenced an increase in communication, other factors could have also contributed to the change, such as the timing of survey administration (e.g., communication may happen at set intervals, such as bimonthly check-ins or when a consumer visits his or her primary care provider).

Interviews with IHSS consumers also reveal strong satisfaction with the quality of care. Additionally, in three home visits with consumers during NORC's second site visit, consumers expressed support for the providers' training. In one case, a consumer had even re-arranged service hours so that her provider could attend classes. Consumers were able to relate concrete examples of benefits of the training and greater willingness to follow the provider's lead in making lifestyle changes because they had confidence in the information imparted by the trainings.

It is unclear to what degree the quality of care changed due to the program coursework itself. However, IHSS consumer interviews did provide specific examples of changes in their care. In one example, an IHSS provider encouraged his consumer to change her diet to reduce sodium intake and increase potassium to help her avoid muscle spasms. She explained that these changes had helped her feel better and reduced her trips to the ED.

Relationship with IHSS Provider. Most consumer respondents (94 percent) report working with the same main IHSS provider before and after the training, with little change in the number of providers working for and living with respondents, as shown in Exhibits CLTCEC.7 and CLTCEC.8. Most consumers (95 percent pre-survey, 93 percent post-survey) work with one IHSS provider; roughly 40 percent have one IHSS provider living with them; and more than half (57 percent) report at least one provider who is a family member. At the beginning of the training, 20 percent of consumer respondents had worked with their main IHSS provider for less than a year, 29 percent worked with their main provider for one to three years, and 25 percent worked with their provider for three to six years. On average, consumer respondents in the analysis are approved for 78 IHSS hours per month, lower than the average 82 hours approved for the consumer survey sample as a whole (including unmatched

observations). Sixty-four percent of consumer respondents report that they "always" (33 percent) or "often" (31 percent) instruct their main IHSS provider about what to help them with, and most (91 percent) report that their provider listens to them (68 percent always and 23 percent often).

Health. Survey findings indicate that the CLTCEC training program positively affects the health of consumers. Between the pre- and post-survey periods, IHSS consumers report significant improvements in both physical and mental health outcomes. Specifically, there is an increase in the proportion of consumer respondents reporting excellent, very good, or good health after the training. There is also a significant decline in the percentage of consumers who report feeling sad or depressed "all of the time." After the training, a higher percentage of consumer respondents do not report any ED visits (67 percent pre-survey, 70 percent post-survey) or hospitalizations (79 percent pre-survey, 84 percent post-survey) in the past four months. There is, however, a slight increase in the number of consumer respondents reporting three to four ED visits, as well as those reporting three to four hospitalizations, in the four months prior to the survey.

Workforce Development

Staffing

As noted in NORC's Second Annual Report, CLTCEC field coordinators have had to adapt to increased expectations and changes to program recruitment strategies. In addition, field coordinators serve not only as recruiters, but also as motivators for trainees throughout the 17-week program. Providing the necessary support to help them transition and succeed has been vital. To this end, lead instructors have been designated to provide guidance and support to the program's growing teaching staff. In addition to their regular teaching duties, lead instructors provide oversight of the other instructors and mediate between instructors and senior management. In year three, two instructors were promoted to the role of lead. Overall, participants have rated instructors very highly, and indicate that they would recommend the training to their friends and family.

Training

The CLTCEC provider survey, also developed by the University of California at San Francisco, captures the experiences of IHSS providers with the care team integration training, measuring trainee satisfaction and perceived effectiveness of the training in improving home care skills and facilitating integration into the consumer's healthcare team. IHSS providers completed the survey on paper or via Nook tablets at the beginning and end of training. As described above under the consumer survey, the workforce survey is not a true pre- and post-survey design, but does allow for comparison of baseline and post-training responses, and data are thus referred to as pre- and post-survey. A total of 6,090 providers participated in the pre-training workforce survey, and 6,393 participated in the post-training workforce survey. This analysis includes 4,561 pre-post matched observations (i.e., respondents). Detailed workforce survey results may be found in Appendix F.

Trainee Background. Most IHSS provider respondents (90 percent) are female and 30-64 years of age (83 percent). Thirty-six percent identify as White, 20 percent as Asian, and an additional 32 percent identified as other. Roughly half (51 percent) of the respondents are Hispanic or Latino. Similar to the

consumer survey findings, most IHSS provider respondents speak English (50 percent) and/or Spanish (49 percent), with an additional 17 percent speaking Armenian as a main language. A quarter earned an advanced degree (i.e., associate's degree, bachelor's degree, or more than 4 years of college) or technical certificate, 17 percent are high school graduates, and 41 percent have not completed high school. Of those providing an annual household income (n=3,771), 71 percent earn less than $30,000, with only 10 percent earning $50,000 or more.

Nearly all IHSS provider respondents (99 percent) are currently employed as a caregiver, with most (88 percent) in Los Angeles County. Most have been working as an IHSS provider for more than two years (74 percent), with someone who is 65 years or older (63 percent), and care for a family member (65 percent); of those providers caring for a family member, 67 percent live in the same residence as their family member. Thirty-two percent of IHSS provider respondents report working more than 40 hours in the past month as an IHSS provider, and most earn $8.00-$12.20 per hour (96 percent). Thirty-four percent have previous formal or informal training in the health or home care fields, including CPR (51 percent), home care training (46 percent), and First Aid (44 percent).

We evaluate the impact of CLTCEC's innovation using the Kirkpatrick model for assessing training program effectiveness.

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact. What benefits to the organization resulted from the training?

Reaction to Training. Overall, IHSS provider respondents' evaluations of the training course and instructor are positive. Almost all IHSS providers (97 percent) are satisfied with the training overall and with various aspects of the training, noting that the time of day the classes were held was convenient (95 percent), that the instructor was well prepared (97 percent), the instructor explained the materials in an easy to understand way (94 percent), and that the participant guide materials were easy to understand (93 percent). While evaluations are generally positive, a quarter of IHSS provider respondents report not having enough time to learn the content covered in the training, and 15 percent unable to understand what the instructor was saying. In three focus groups during NORC's first site visit, trainees expressed great satisfaction with classes; for the most part they reported that their consumers were also happy with caregiver training, and interested and receptive to new information and practices in the home, particularly regarding safety and nutrition. In provider focus groups conducted during NORC's second site visit, providers noted that they valued the curriculum and found the training helpful in coping with family member consumers. Providers also felt that the training improved their communication, self-care skills, and general relationship with their consumers.

Learning From Training. At baseline, the top three expectations of providers are to learn more skills on how to care for IHSS consumers (82 percent), to be better able to help IHSS consumers (73 percent), and to be better informed about healthcare issues (72 percent; pre-survey findings, not presented). After the training, IHSS provider respondents generally describe feeling more prepared and better able to perform their job as an IHSS provider. Almost all report an increase in knowledge of how to care for a person at home (96 percent); learning new skills (94 percent), in particular how to communicate with a consumer's care team (94 percent); and feeling better prepared to perform their job (94 percent).

Behavior Change Following Training. About 60 percent of IHSS provider respondents report increased communication with a consumer's healthcare team since the training, and most (77 percent) would like to communicate with a healthcare team always or often in the future (as opposed to only 74 percent in the pre-test). Providers note that the training helps them to provide better care, including learning how to bathe a consumer in a dignified manner and how to talk more confidently with providers.

> One participant reported that the training helped improve a variety of home-care skills: "I enjoyed the class, the information. It was important, like how to lift a consumer in and out of the bathroom. We had tried previously and I didn't do good. And the lift belt, which I didn't know about. Different things, like helping with hygiene, brushing her teeth."
>
> --Trainee

However, responses on pre-training surveys differ between consumers and providers—while 68 percent of *consumers* report their main provider did not communicate with their healthcare team in the past month (see Exhibit CLTCEC.9), only 22 percent of *providers* do not report any communication. This discrepancy in reporting between consumers and providers may be related to lack of communication between the two groups of survey respondents, lack of awareness of healthcare team discussions on the part of the consumer, or over/under-reporting by the either or both groups of survey respondents. For providers, nevertheless, the percentage of respondents who do not report any healthcare team communication decreased to 19 percent in the post-training survey. Providers report communicating with a consumer's healthcare team an average of five times at the beginning of training, and four times post-training, with the most common means of communication being by phone (56 percent pre-survey, 65 percent post-survey) or in-person (67 percent pre-survey, 69 percent post-survey).

> "Since I have a lot going on, it has helped me be more compassionate and understanding. At first, it was just my family member and I thought she was faking it and she just wanted the attention. I see now that it's not true, it's a lot of pain. A lot of people don't have compassion. The communication is so important, seniors live alone and they want the compassion and communication."
>
> --Trainee

As noted above, feedback from the trainees has been positive. A majority of trainees did not express intentions to leave their current job, and 57 percent report that they would feel guilty if they did. Providers who report caring for a family member (65 percent) are twice as likely to feel an obligation and responsibility to remain in the home care field than those not caring for a family member. Focus groups of IHSS trainees reflect increased knowledge and increased comfort as a care provider, and a sense of empowerment as a professional. Many stated that they would like to continue training and coursework should CLTCEC offer additional or advanced opportunities.

Context: CLTCEC in its Third Year

External Context. CLTCEC exists within a complex regulatory landscape in California, where a separate state agency (IHSS) provides in-home services and supports for persons with disabilities and functional limitations enrolled in Medicaid. Moreover, IHSS operates at the county level, meaning that CLTCEC must contend with a variety of different recruitment strategies, pay rates, and procedures. In addition, some consumers of IHSS services in California are protective of their right to designate who will be their PHCA, and are generally opposed to minimum qualifications or training requirements for these workers. As a result, CLTCEC has been careful to endorse training as an important option and not a requirement of IHSS employment.

As noted in NORC's Second Annual Report, statewide policy had significant potential to affect the CLTCEC program. California's Coordinated Care Initiative (CCI) presented both challenges and opportunities for CLTCEC. While the CLTCEC training program goals align with the CCI aims of addressing overall fragmentation of care and integrating services and supports for dual-eligible Medi-Cal recipients, implementation of CCI at the time of HCIA funding meant that health plans were unable to dedicate adequate attention to collaborating with CLTCEC on the training of IHSS providers. In the program's third year, CLTCEC program staff report that area health plans are becoming more familiar with their responsibilities under CCI and the IHSS program itself, and have been more receptive to the training. The active involvement of health plans is integral to the program's success, as the plans offer important input on training curricula and facilitate integration of the IHSS providers into the consumer's care team as a whole. Additionally, health plan data are a useful tool for identifying high-risk consumers and tracking program effectiveness.

Internal Context. Important internal program factors affecting the implementation of the CLTCEC training program include an early change of leadership and program connections with the SEIU. A change in project leadership in the first year facilitated important changes to the program's recruitment strategies and curricula. Collaboration with SEIU lends the CLTCEC program a higher profile and boosts the network of providers from which it is able to draw. In addition, the awardee notes that the population that it serves is a unique one. CLTCEC staff emphasizes the importance of flexibility in tailoring an intervention to a diverse population: "We know how to reach the population very well… We were able to move quickly, adjust and be flexible."

Sustaining, Replicating, and Spreading Innovation

Sustainability. CLTCEC intends to sustain the training curriculum, although on a smaller scale. As of March 2016, the program offers three courses in Los Angeles in Spanish and English. Recruitment continues to draw on relationships with the local SEIU and home care workers. Eligibility requirements for consumers have been expanded; consumers can now be younger than 18 and not meet high-risk criteria, both of which were requirements for participation in the CMMI-funded demonstration.

SEIU will continue to provide program support, and the program is in discussions with county health plans, foundations, and local unions to support the training program. The awardee has created a documentary about the program in order to raise awareness about the effectiveness of the model. The awardee hopes that the video will be a useful tool to "tell the story of [the] project so that way there are faces attached to it" and "get it to a wider audience and see the impact from the eyes of the participants in addition to partners."

Replicability and Scaling. The CLTCEC curriculum appears to be readily scalable to other home caregiver populations. The awardee has been pursuing various avenues to replicability and scaling. These include various foundation and grant opportunities. As we noted in the Second Annual Report, contextual factors that promote or hinder sustainability often have similar effects on replicating or scaling up an intervention. In the case of CLTCEC, public policy and regulatory environment play a significant role in both the sustainability and replicability of the program. In particular, the influence of state labor certification requirements for direct care workers and of state and federal regulations to ensure patient choice can disrupt the continuity of care.

In addition, as mentioned earlier, organizations seeking to replicate the program should note CLTCEC's lessons learned with regard to recruitment approach and the number of training hours required for participants.

Summary

CLTCEC developed a curriculum that may be easily packaged for other groups focused on direct care workforce development and trained 6,598 IHSS provider and consumer pairs. They made several adaptations in response to challenges encountered during implementation and feedback from staff and trainees. To address recruitment challenges, CLTCEC moved from a telephone to an in-person approach, and an increased focus on referrals and word-of-mouth recognition. In addition, they shortened the number of training hours required.

Our claims-based findings for the CLTCEC intervention show no evidence that the CLTCEC program is reducing cost or utilization across the entire post-intervention period, relative to the comparison group. However, we do see significant reductions in cost and ED visits in the second year after program enrollment, indicating that participants who are enrolled for longer than one year are seeing more benefits from the program.

The policy environment in California is unique and poses challenges to sustainability for CLTCEC. Other agencies seeking to replicate this model should take the disability rights environment in their state or region into account, especially with regard to support for mandatory IHSS training.

References

Awardee's supplemental documents: sustainability plan (Q14), survey-related materials, final report

HCIA Narrative Progress Report for California Long-Term Care Education Center, for Reporting Quarter End Date 6/30/2015. Submitted by CLTCEC, 7/30/2015.

HCIA Quarterly Report for CLTCEC, for Reporting Quarter End Date 6/30/2015. Submitted by CLTCEC, 08/31/2015.

HCIA Narrative Progress Report for California Long-Term Care Education Center, for Reporting Quarter End Date 9/30/2015. Submitted by CLTCEC, 10/29/2015.

HCIA Quarterly Report for CLTCEC, for Reporting Quarter End Date 9/30/2015. Submitted by CLTCEC, 12/9/2015.

HCIA Narrative Progress Report for California Long-Term Care Education Center, for Reporting Quarter End Date 12/31/2015. Submitted by CLTCEC, 1/29/2016.

HCIA Quarterly Report for CLTCEC, for Reporting Quarter End Date 9/30/2015. Submitted by CLTCEC, 3/02/2016.

Community Care of North Carolina

Child Health Accountable Care Collaborative. The collaborative provides care coordination among pediatric subspecialists, embedded project teams, and community pediatricians to serve medically complex children (infancy through age 20), described by awardee as specialty care co-management. There are 11 sites across North Carolina, encompassing five academic medical centers and seven tertiary medical centers not affiliated with universities.

PROGRAM MODELS: Care/Case Coordination, Caregiver Education and Support, Patient Navigation, Clinician Decision Supports

LOCATION: North Carolina

GRANT: $9,343,670

AWARD DATES: 1/15/13 to 6/30/15

NO-COST EXTENSION: N/A

PAYER(S): Medicaid, Children's Health Insurance Program

REACH: 15,898 beneficiaries (98% of target)

POPULATIONS: Children, Disability, Racial/Ethnic Minority, Rural

DATA: NORC workforce survey, awardee caregiver survey, two site visits (10/14, 5/15), telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Recruitment strategy shifted from claims algorithm to abstract data type (ADT) and provider referrals over the course of the intervention.
- Development of clinical practice guidelines through consensus process convened by NC pediatric society, on high-priority topics, enabled community pediatricians to manage care of medically complex children.
- Each site has tailored the model to meet the needs of the patient population at that particular site.

WORKFORCE

- Multidisciplinary team consists of RN care managers and non-clinical (lay) patient coordinators with tasks that vary by site.
- Training includes didactic coursework but emphasizes on-the-job learning and hiring of staff with care coordination experience.
- Physician champion at each site, and steering committee members, are important to success and sustainability.

CONTEXT

- CHACC integrated care coordination for highest-risk children blends into existing statewide network of care coordination programs administered by CCNC, state and county health departments, and providers.
- Major changes to state Medicaid program presented challenges to recruiting and monitoring implementation, staffing, planning for sustainability, and obtaining claims data important to evaluation.

OUTCOMES[§]

Analysis limited due to lack of claims data

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

Elements of CHACC have been adopted by sites. Pending state Medicaid reform, CCNC plans to integrate elements of its CHACC intervention into a new Innovation Center, LLC. This will be part of a new statewide provider-led clinically integrated network (Community Care Physicians Network of NC), which is a Medicaid ACO operated by CCNC on behalf of three state professional societies (family physicians, pediatricians, and community health centers).

REPLICABILITY & SCALING

There are no plans to replicate or scale the intervention.

[§]This front page summary of the CCNC awardee chapter includes findings based on NORC's original analyses. The awardee chapter includes quality of care and health outcomes that represent the original work of the awardee; however, only findings developed by NORC are included in this front page summary.

Overview of the Child Health Accountable Care Collaborative

Background. Community Care of North Carolina (CCNC) is a nonprofit that has operated Medicaid care coordination programs and practice supports for patient-centered medical homes over many years, in collaboration with the state and county health departments and regionally organized networks of hospitals, clinics, and providers, and the North Carolina Pediatric Society. The Child Health Accountable Care Collaborative (CHACC) was designed by long-time CCNC staff and former state health department officials, who modified a pilot of shorter-term (30 day post-discharge) transitional care that reduced rehospitalizations and launched other coordination efforts that joined primary care providers, specialists, and hospitals on a regular basis.[34]

> "85 percent of primary care physicians are members of CCNC, plus all hospital systems…Pediatricians are forward thinking in public health and Medicaid. It is the driver of their practice. It made sense to do more integration with health centers for medically complex kids. We just had to flip the right switches to get them to care for them."
>
> –CHACC project leadership

CHACC Site	Location
Cape Fear Valley Health System §§	Fayetteville
Carolina HealthCare System §	Charlotte
Carolina Medical Center NE §§	Concord
Duke Health §	Durham
Mission Health System §§	Ashville
Moses Cone Memorial Hospital §§	Greensboro
New Hanover Regional Medical Center §§	New Wilmington
Presbyterian Medical Center §§	Charlotte
UNC HealthCare §	Chapel Hill
Vidant Health/East Carolina University §	Greenville
Wake Forest Baptist Medical Center §	Winston-Salem
WakeMed Health and Hospitals §§	Raleigh

§Academic Medical Center
§§Tertiary Medical Center

CHACC uses CCNC's networks to link pediatric specialty care more closely with primary care delivered by community pediatricians—what the awardee describes as "specialty care co-management"—so that care for medically complex children can be managed at the community level. The fourteen network partners include five academic medical centers and seven tertiary care hospitals that deliver specialty and subspecialty pediatric care; each network partner hosts a clinical services and coordination site as part of CHACC. The state pediatric society has been actively involved in promoting CHACC and supporting the creation of clinical care guidelines that further enable community pediatricians to manage the care of these high-risk children.

Ongoing public delivery system reform in North Carolina has shaped implementation fundamentally, from launch through plans for sustainability. In 2013, a change in the Medicaid claims processing vendor delayed data availability for almost a year. CCNC launched a workaround in April 2014, using hospital admission, discharge, and transfer (ADT) notifications, claims information collected from providers, and provider referrals to identify prospective enrollees.

Goals. Although CCNC shares the CMMI core metrics of reducing utilization and Medicaid costs for enrolled children, the awardee has identified objectives that are more closely tied to improvements in the care of medically complex children, including the sharing and updating of treatment plans between

[34] Jackson et al., 2013.

specialists and community pediatricians, engaging family caregivers in the treatment plan, and reducing the impact of a child's illness on family life (e.g., days of school and work missed).

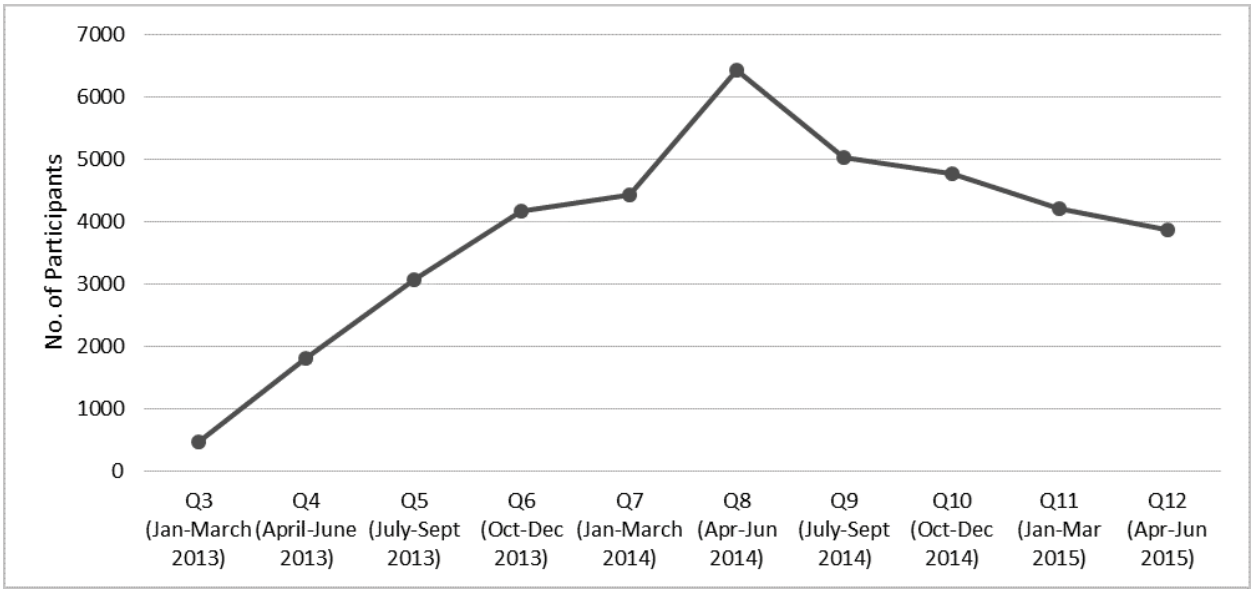
Program Model and Practices. The awardee tests multiple approaches to innovation. It has added a new, narrowly tailored set of services intended to fill gaps for the most high-risk children, who may already be served by an existing array of Medicaid care coordination programs across the state. One program manager described an initial step in enrollment as identifying whether CHACC or another care coordination program is most appropriate, given a child's needs and the local mix of programs and providers. CHACC is a decentralized model, with each of the 11 sites (a health care network operated by a community-based organization or foundation) adapting staffing, tasks, and health IT. What distinguishes CHACC is the collaboration between care manager and patient coordinator, both part of a team embedded in an academic medical center or tertiary hospital. The team coordinates care and makes referrals to community resources. It also coaches family caregivers and helps them navigate the health care system in collaboration with the child's pediatrician. Consensus-based clinical care guidelines created by pediatric subspecialists on high-priority topics (e.g., constipation, headaches) offer further support to pediatricians in managing the child's care locally, rather than making a referral to hospital.

Implementation Updates. NORC's Second Annual Report (2016) includes HCIA awardee self-reported data through March 31, 2015, as well as data gathered by NORC through July 1, 2015. CCNC continued to generate self-reported data for the final 90 days of its performance period (April 1 through June 30, 2015). Key developments related to implementation during the final months of performance include the following:

- Staff turnover due to budget cutbacks. Starting in January 2015, CHACC lost key personnel, including its project manager and data analyst, with more layoffs anticipated.
- Ongoing change in state delivery system reform. These changes are likely to affect CCNC's role in North Carolina's Medicaid program. In July 2015, the state legislature enacted changes that would shift the Medicaid program from being publicly administered through CCNC, to a quasi-privatized approach featuring Medicaid managed care and regionally organized clinician-led health plans.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from CCNC provide participation by HCIA reporting quarter, as seen in Exhibit CCNC.1 and as displayed in previous NORC reports to CMMI. There was a steady increase in participation over the first five quarters of implementation (through June 2014), followed by a decline. During the final quarter of performance under HCIA funding (April 1 through June 30, 2015), the awardee reports serving 3,871 beneficiaries. As of June 30, 2015, CCNC had served a total of 15,898 participants since program launch, 98 percent of the total number projected over the three years of the HCIA-funded program.

Exhibit CCNC.1: Total Number of CHACC Participants, by HCIA Reporting Quarter



For the group of participants directly served from April 1 through June 30, 2015:

- **Age Cohort:** About two-thirds are between the ages of 1 and 11 years (68 percent), 21 percent are ages 12 to 18 years, 6 percent are young adults between the ages of 19 and 25, and 5 percent are between 1 month and 1 year of age.
- **Gender:** More males (53 percent) than females are enrolled.
- **Racial and Ethnic Identity:** 50 percent are white, 42 percent are African American, and 11 percent are reported as "unknown."

In this chapter, we present our summative findings, based on survey and qualitative sources (telephone interviews and two site visits), and findings on the topics of workforce development, context, and sustainability, all updated since NORC's Second Annual Report to CMMI.

Summative Findings (Outcomes)

NORC has been unable to obtain access to Medicaid claims data that would enable us to analyze the impact of CHACC on cost, utilization, and quality of care for high-risk children. Alpha-MAX data for North Carolina were unavailable. Our ability to interview CHACC beneficiaries (medically frail minor children) and their caregivers was limited; most of our understanding of impacts on quality is based on one focus group with parent caregivers and two surveys fielded by CCNC.

Core Measures

While NORC's evaluation of the CHACC innovation has not included estimation of claims-based measures, CCNC has shared a preliminary, claims-based difference-in-differences analysis that identifies improvements in utilization and cost for CHACC enrollees. The analysis identifies statistically significant, per-patient per-month cost savings for children at least one month of age (n=1,291) enrolled

in CHACC following a hospitalization; for newborns (n=74), there is an increase in costs that is not statistically significant. For non-newborns enrolled post-discharge, there is a significant decrease in emergency department visits and a decrease in hospitalizations (excluding surgeries, considered to be appropriate for this high-risk cohort) that doesn't reach statistical significance; for children enrolled as newborns, there are decreases in ED visits and hospitalizations, neither of which reach statistical significance. The findings shared by CNCC indicate that CHACC may achieve cost savings and reduced utilization as a transitional care program for children at least one month of age. We are unable to duplicate or confirm CNCC's findings, as NORC cannot verify the specification of measures or how comparators were selected, nor can we independently validate the analysis.

Quality of Care: Survey and Qualitative-based Outcomes

Timeliness of Services Delivery. Our evidence of timeliness is based on staff reports and a single focus group convened with caregivers, as NORC was unable to validate CHACC's consumer and caregiver survey findings. During site visits, staff described numerous examples of how the CHACC model of coordination between specialists and community pediatrician enabled a singular focus on connecting beneficiaries and their families with resources such as assistive technology and durable medical equipment, from confirming with providers to ensure that technology has been prescribed and documentation and signed paperwork faxed to the vendor to the timely processing of the request. While many credit CHACC with improving care coordination and communication across providers and care settings, staff and network physician champions indicate that shortages of subspecialists and some reluctance on the part of community pediatricians to manage the care of CHACC's medically complex patients, can hamper timely services delivery for enrolled beneficiaries.

Consumer Experience and Satisfaction. The awardee's internal survey of patient and caregiver satisfaction includes items related to lost days of school or work, finding that participants (n=157) are significantly less likely to have four or more school absences, compared with their experience before enrolling in CHACC. No significant differences are seen in the likelihood of parent caregivers (n=109) missing days of work due to a child's illness.[35]

Informal (Family) Caregiver Experience and Satisfaction. As noted above, assessing caregiver perspectives on CHACC is difficult at best, due to limited evidence available to NORC and reflecting the fact that the intervention was designed to be invisible to beneficiaries and their families, part of a continuum of care coordination programs offered by CCNC and its affiliated network of providers. There is preliminary evidence that coaching parent caregivers of high-risk children strengthens their abilities to navigate the health care and long-term care systems, to use durable medical equipment, and to manage their child's symptoms.

> "It allows me to be a mother and not a monitor and nurse. It was a huge shift." –Focus Group Respondent, Family Caregivers [10.23.2014]

[35] See Appendix F for NORC's usability assessment of CCNC's survey data and findings.

Workforce Development

Staffing

Dedicated CHACC staff members are embedded in academic medical centers and tertiary care hospitals. Care managers are typically RNs, social workers, or NPs who are clinically oriented. They coordinate data-sharing between specialists and community pediatricians, conduct post-discharge follow-up, and participate in patient and caregiver education. Patient coordinators typically do not have a medical background and assist with social services referrals and patient navigation. Specific roles vary from site to site, with one focus of implementation being the clarification of roles across the CHACC team as well as the relationships between CHACC team members and other care coordinators within the network (hospital, community).Initial plans to hire military veterans to serve as patient coordinators were not realized. Each network site has tapped internal hires or experienced administrative or lay staff for this position, much as clinician hiring has drawn on existing staff at each site and from persons already working for CCNC; CCNC's existing model of care coordination across interprofessional teams is used for CHACC. In addition, a steering committee comprising clinicians (both community pediatricians and pediatric subspecialists) advised on the overall management of CHACC and contributed to the development of clinical practice guidelines.

"We hit the floor and keep going but that because I was already familiar with care management and had years of experience. I was already familiar with CCNC and their systems. The biggest thing for me was getting to know the docs and how they worked best. As far as training, it was good because I shadowed someone who already figured it out. There were manuals that I reviewed with Lynn [CHACC manager]. I had to learn the flow but CCNC prepared me well. " –Group Discussion with CHACC Staff

"From my perspective, it [the staffing model] seems like the right approach. You need the clinical person to educate patients, translate needs, and advocate. The coordinator person is necessary for social services. It makes sense from [a] clinical and efficiency perspective." –CHACC project leadership

Cutbacks in North Carolina's Medicaid program affected CHACC in its final year of implementation (July 2014 through June 2015). The loss of staff as the grant period drew to a close was accelerated by CCNC layoffs in 2015 due to budget shortfalls in other programs, as most program staff members did work not full-time with CHACC. The loss of CHACC's lead data analyst and program manager in spring 2015 was especially damaging.

Training

Care managers and patient coordinators participate in three specific levels of training—for CCNC, the health care network, and CHACC—each delivered by a different person or organization. Trainings are delivered in person and online, and CHACC maintains an online repository of training materials. In addition, shadowing and on-the-job training are common. There is little evidence that initial plans for patient coordinators to take an online case management assistance class through local community colleges were realized, although one focus group respondent (patient coordinator) described completing such a course. Many CHACC team members brought the requisite skills from previous work and were trained on the job.

We present findings from NORC's workforce trainee survey (n=29) in our Second Annual Report to CMMI (2015). In this section, we revisit and summarize these descriptive findings, evaluating the impact of CCNC's staff development using the Kirkpatrick rubric for assessing training program effectiveness.[36] The scope of our evaluation encompasses Kirkpatrick Levels 1 and 2, with limited attention to Level 3.

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact. What benefits resulted from the training?

Trainee Background. About two-thirds of respondents work as a care manager or lead care manager (63 percent), with patient coordinators comprising 24 percent of respondents. Over half report holding a 4-year college degree (55 percent) and 14 percent have a clinical master's degree. Fifty-five percent have worked for CHACC for at least two years, almost one-third for one to two years (31 percent), and 10 percent have been with CHACC for less than one year; only 35 percent report working with CCNC on a care coordination project prior to CHACC. Most respondents are female (90 percent) and white (79 percent), with an average age of 46 years and about 15 years' experience working with patients.

Staff Tasks. Across respondents, the most common tasks include coordinating communication with providers and other care coordinators (83 percent); follow-up with participants (83 percent); referrals to community resources and programs (76 percent); and participant and caregiver education (76 percent). Patient coordinators are more likely to report involvement with referrals and less likely to be involved with participant education or navigation.

Satisfaction (Reaction to Training). Most respondents find each of the three trainings moderately to very useful: 76 percent for CHACC, 83 percent for CCNC, and 100 percent for network training. Care managers are more likely than patient coordinators to find "informal conversations as needed" very useful (70 percent versus 57 percent), while patient coordinators are more likely than care managers to rank shadowing as very useful.

Learning From Training. Almost three-quarters of respondents (72 percent) describe themselves as prepared to work with other providers, 69 percent as prepared to use technology, and 59 percent as prepared to meet the needs of their patients.

Implications for Workforce

Teamwork and Feedback on Performance. Most respondents (81 percent) agree that the information they give to other providers is used for clinical decision-making, and all indicate that their work in collaboration with a provider team has a positive impact on the quality of participant care. Respondents are more likely to identify peers and shadowed staff as most helpful (70 percent and 95 percent, respectively), 50 percent describe the leadership team as most helpful, and fewer give this ranking to supervisors (41 percent) and trainers (33 percent). Most (82 to 96 percent) report that their supervisors, managers, and team members provide suggestions and support on things they can improve, offer feedback

[36] See Appendix F for survey findings, reproduced from NORC's Second Annual Report to CMMI.

on things they are doing well, and assist with problem solving or advice. Seventy six percent agree or strongly agree that they get the help and support they need to do their job.

Satisfaction. 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). Over half (59 percent) indicate that work-related stress stayed about the same after joining CHACC, while 17 percent note an increase and 21 percent a decrease. Overall, 80 percent of respondents describe themselves as satisfied or very satisfied with aspects of their jobs, with working relationships receiving the highest ranking (62 percent very satisfied) and work/life balance the lowest (38 percent very satisfied). Sixty-six percent report that they wish to stay at their job, all else being equal.

> "There is a lot of autonomy in this position. That is something I love about this position. You have to be a self-starter and disciplined. Although we have manuals, each patient or physician that I interact with, it's not a protocol and you have to think outside the box…" – Focus Group Staff Respondent [10.23.2014]

Context: CHACC in Its Third Year

CCNC launched CHACC to expand and refine a model of transitional care for medically complex children, one linked with cost and utilization savings (see above) and designed to leverage a rich array of existing care coordination programs and clinical relationships across CCNC's partner health care networks. Significant changes in North Carolina's Medicaid program, particularly during 2015, have posed serious challenges to implementation, evaluability, and sustainability. Contextual factors internal to the awardee and its partner organizations have helped to bolster the CHACC program through the challenges of ongoing delivery system reform.

External Factors. While CCNC was able to make progress during 2014 and 2015 in obtaining claims for use in monitoring and evaluating CHACC, more broad-based changes in the Medicaid program resulted in staffing cutbacks, including the loss of CHACC's program manager and lead data analyst. During spring 2015, CHACC leadership awaited news from the state legislature, whose members considered legislation to transform North Carolina's Medicaid program from publicly administered to privately run by commercial health plans, a destabilizing development for CCNC as a long-time Medicaid vendor.

> "I think the medical centers will have an interest in sustaining the programs because of healthcare reform and finance. They can't afford to have unnecessary hospitalizations. We worry about the care coordinators going away. That's where the grant money is now...You want to unify the services, not fragment it by giving this function to the [Medicaid] health plans." –CHACC project leadership

Internal Factors. Close relationships among providers across CCNC and its networks, and the overall decentralized structure of CHACC, with each site tailored to local needs and circumstances, has given CHACC resiliency in the face of fiscal and organizational uncertainties at the state level. Physician champions at each site, steering committee members, and the principal investigator, Dr. Steve Wegner, have ensured continuity of operations, if not fidelity to a specific staffing model or role for CHACC among care coordination programs. The awardee's leadership team has demonstrated the ability to support successful implementation by making "connections with on-the-ground folks and facilitated the embedding of the program" and by demonstrating that leadership "understands the culture, the way

healthcare is delivered here across all the subspecial[ties] and can match that to the aims of CHACC" and each network site.

Sustaining the Children's Health Accountable Care Community

The awardee's sustainability plan (most recent version dated July 30, 2015) describes a transition for CHACC in concert with changes in CCNC's relationship to the state Medicaid program. Initial plans were to create two partner organizations: the Innovation Center, LLC and a new clinically integrated network called the Community Physicians Network of North Carolina, LLC. The latter was to be overseen by the state as a Medicaid Accountable Care Organization, with full implementation anticipated to occur in 2017.

"In the second year, the big thing was sustainability. To make this sustainable, it was not just getting a grant to support the integration of hospitals with primary care, it's "here's a new environment, how I can get all the good things in that and make it last". The CIN [Clinically Integrated Network] fits into their system and also had a very strong children's component that recognizes the unique delivery system for children. And recognizes that it needs to be statewide, rather than a regional Medicare network." –CHACC project leadership

As of spring 2015, when NORC collected its final data on CHACC, over half of the state's participating networks appeared to be planning to sustain elements of the HCIA-funded intervention, as part of their care coordination activities for medically complex, high-risk children covered by Medicaid. The patient navigation services and communication between specialists and community pediatricians, together with the clinical guidelines, were especially important in supporting patient-centered medical homes at the community level. Each network would be expected to fund its own programs. In summer 2015, North Carolina enacted legislation that moved the state from a publicly administered Medicaid program (with CCNC providing technical assistance and a variety of care coordination programs) to a quasi-private arrangement, with regions served either by a Medicaid managed care plan or a provider-led clinically integrated network. We understand that elements of CHACC are being sustained both by the sites and by CCNC, but without the CHACC name or program office.

"The idea of hooking hospitals and specialists to primary care is going to survive. The guidelines will definitely survive…In general, the principles will continue. There are certain things that may be scaled back…" –CHACC stakeholder

There are no plans to replicate or scale this intervention. The co-management of medically complex children is a model that could be replicated elsewhere, but the state context within which CCNC operates CHACC is unique.

Summary

Over the three-year implementation period, CCNC developed a decentralized network of specialty care co-managers, embedded at academic health centers and specialty hospitals across the state, to improve access and quality of care for high-risk children enrolled in the Medicaid program. Despite significant challenges to implementation, related to ongoing reform of North Carolina's Medicaid program and the sheer diversity of network sites in terms of staffing and participant needs, the CHACC intervention served nearly 16,000 beneficiaries, almost 100 percent of its target.

Changes in the Medicaid program left both the awardee and NORC without timely access to Medicaid claims data, either for the awardee to use as planned for participant targeting, recruitment, and monitoring, or for NORC to use in this evaluation. CCNC shared findings from its own claims-based evaluation of program outcomes, indicating cost savings and reduced utilization for children at least one month of age (non-newborns) admitted post-discharge; we are unable to assess the reliability of these estimates. Dedicated CHACC staff embedded in the 11 participating CCNC health care networks described their work as both moderately stressful and highly rewarding, praising the experiential aspect of their training.

References

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Jackson CT, Trygstad TK, DeWalt DA, DuBard CA. 2013. Transitional Care Cut Hospital Readmissions For North Carolina Medicaid Patients With Complex Chronic Conditions. *Health Affairs* 32 no.8: 1407-1415.

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Courage Kenny Rehabilitation Institute

Advanced Primary Care Clinic. A medical home serves patients with physical disabilities, including spinal cord injury, traumatic brain injury, and musculoskeletal conditions. Primary and specialty care are co-located with referrals for community service and supports and classes taught jointly by a nurse care manager and peer.

PROGRAM MODELS: Care/Case Coordination, Chronic Disease Self-Management, Independent Living Skills Support, Integrated Care Delivery, Telehealth.

LOCATION: Minneapolis, MN
GRANT: $1,767,667
AWARD DATES: 12/27/12 to 6/30/16
NO-COST EXTENSION: 12 month, full program
PAYER(S): Medicare, Medicaid

REACH: 143 beneficiaries (102% of target)[§]
POPULATIONS: Disability, Dually Eligible
DATA: Medicare claims (1/13 to 8/15) Medicaid claims (9/13 to 12/14); NORC consumer/caregiver survey (2015); one site visit (2014), telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Organizational merger with Allina slowed roll out of program.
- Close and sustained partnership with independent evaluator leverages awardee capacity to succeed.

WORKFORCE

- Co-location of interdisciplinary team facilitated communication.
- Care coordinators receive on-the-job training experience and mentoring.
- Telemedicine volunteer receives intensive training.

CONTEXT

- Strong organizational support for awardee has contributed to success.

OUTCOMES[§§]

COST

- Reduction in total quarterly cost of care (-$1,943 per beneficiary, Medicaid)

UTILIZATION

- Findings not statistically significant

QUALITY

- 81% of survey respondents are satisfied or very satisfied with their CKRI provider

Analysis limited due to small sample size.

HEALTH

- 91% of survey respondents say that the care they received at least partially improved their health.
- 71% of survey respondents say that the care they received help them avoid medical emergencies.

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

During the 12-month no-cost extension for HCIA 1 funding, CKRI continued working on payment arrangements with public and private payers. CKRI has support through a Medicaid demonstration and is negotiating with commercial payers on payment approaches.

REPLICABILITY & SCALING

CKRI is not currently planning to scale this intervention, but is working with Allina leadership to review the results of the HCIA intervention with an eye towards potential opportunities for scaling within the organization.

[§]Target is for initial performance period, through 6/30/2015. [§§]Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the $p<0.10$ level. Outcomes for quality of care and health are from NORC consumer/caregiver survey data.

Overview of Courage Kenny Rehabilitation Institute (CKRI)

Background. Courage Kenny's Advanced Primary Care Clinic (APCC) is a medical home for individuals with disabilities who live independently in the Minneapolis-St. Paul area with community-based supportive care. CKRI serves a unique population of those with physical disabilities, including spinal cord injury, traumatic brain injury, cerebral palsy, and musculoskeletal conditions. Individual participants have an average of 9 to 11 chronic conditions, with depressive symptoms as a common co-condition.

Courage Kenny APCC builds on a successful demonstration piloted for two years prior to HCIA. The APCC offers tailored access to primary and specialty care, including primary care visits using telemedicine, clinic-based care coordination, referrals to community resources, and patient engagement.

In 2013, the Courage Center merged with Sister Kenny Rehabilitation Institute to form CKRI, which is operated by the Allina Health System, a nonprofit health care system operating in Minnesota and Wisconsin. The merger with Allina provided a tumultuous start to the intervention, affecting staff retention, enrollment, and participant perception of instability and uncertainty. However, with strong leadership support, the clinic has continued to grow and adapt to meet the needs of its clients.

Goals. The overall goal of the APCC medical home is to improve patient health and engagement for adults with disabling conditions by integrating medical and community-based care. This includes reducing the number of hospital days and the rate of 30-day hospital readmissions, and increasing patient activation and patient satisfaction.

Program Model and Practices. With HCIA, CKRI enhanced the services it provided to its unique population through the advanced primary care clinic. A core component of the APCC model is an interdisciplinary team that helps patients with diverse needs to access appropriate care and ensures that team members understand the importance of each component of health care (medical, social, emotional) to the participant's overall health. The specialized clinic has inclusive equipment (wheel chair scales, adjustable tables) and co-locates psychiatry and physical medicine and rehabilitation to improve coordination and communication among services. The clinic includes the following components:

- **Care coordination:** Care coordinators help participants schedule and prepare for appointments, coordinate with specialists, and provide patient education.
- **Independent Living Services (ILS):** The APCC medical home pairs an ILS worker with participants. ILS workers aim to address participants' goals, which vary from improved food and housing security, continuing education, or general organization in their lives. Under the state Medicaid Community Access for Disability Inclusion (CADI) waiver an ILS worker is available. HCIA enabled CKRI to offer these services beyond traditionally eligible participants to include those who are near poor, but have not spent down to the level of Medicaid eligibility.
- **Chronic Disease Self-Management (CDSM) Program:** A care coordinator and a trained peer, who is also an APCC client, facilitate a six-week CDSM class on healthy living, adapting the Stanford University model for patients with mobility limitations. The CDSM program teaches self-management skills such as communication, nutrition, appropriate exercise, decision-making, techniques to cope with frustration or fatigue, and evaluation of new medical treatments. The program

is collaborative and participatory, so that patients are able to advocate for themselves and their own care.

- **Telemedicine:** The program includes a telemedicine component to address the significant transportation barriers encountered by CKRI participants. 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. A trained volunteer brings a laptop and hot spot to the participant's home for a video session with the care coordinator, nurse practitioners, physicians, or other members of the care team. The volunteer aids the participant in preparing for the session, such as writing a list of questions and setting up the technology. Volunteers work with the same participant and can serve as an extra set of eyes in the home.

For more detail on each of the program components, please see previous NORC reports to CMMI.

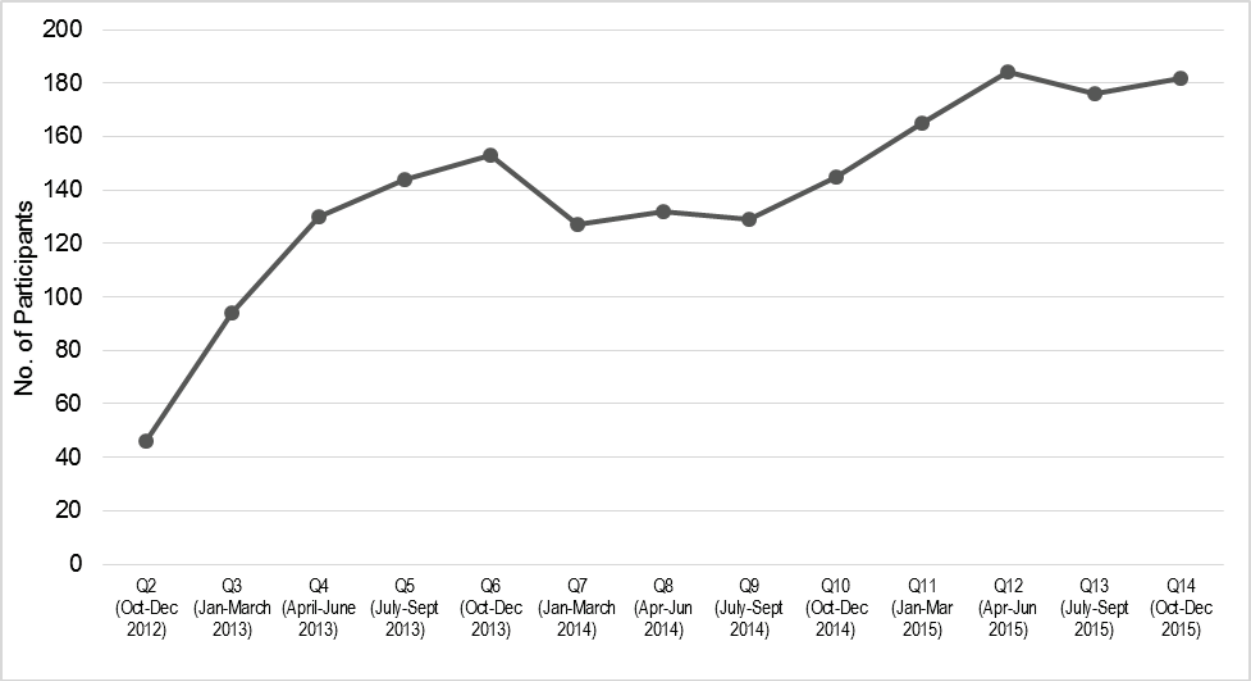
Implementation Updates. NORC's previous annual reports provided an overview of CKRI's implementation experience through the duration of the award period. Noteworthy updates since NORC's Second Annual Report include the following:

- *Electronic Health Record (EHR) Implementation.* In October 2015, the advanced care clinic adopted Allina's EHR system. Until that point, CKRI was based on paper records. Implementation of EHR dramatically changed how care coordinators spent their time, much of which they previously devoted to tracking down information. EHR enables care coordinators to access notes from other Allina providers, patient records from other systems, and real-time lab/imaging results; to communicate with providers within the system; and to view patients' upcoming appointments. EHR increased efficiencies and allowed CKRI to manage a higher volume of patients. Care coordinators now spend more time reviewing information and briefing physicians and NPs on individual patients' cases, and working with patients to prevent mental health crises rather than immediately referring patients to a psychiatrist. EHR has also facilitated referrals from within the Allina system. CKRI is working on building dashboards and other tools to further support coordination, informed by this experience.
- *Behavioral Health Integration.* CKRI continued implementation of a behavioral health integration pilot, creating a new model of treating depression among participants. To date, the pilot has been successful in building the capacity of the primary care team to manage participants with psychiatric illness effectively through targeted training and staff development. The clinic psychiatrist convenes the team weekly to discuss cases and build skills in behavioral health across all team members. As part of this pilot, the behavioral health integration team has evaluated a new shared decision making tool to select antidepressants. In addition, the clinic psychiatrist has also focused attention on evaluating the effectiveness of the Patient Health Questionnaire (PHQ-9) in identifying depression among patients living with brain injuries, managing the entire clinic population with respect to PHQ-9 scores, and systematizing the depression treatment protocol and use of PHQ-9 for participants living with disabilities.
- *Telemedicine.* APCC tested a telemedicine component that included two telemedicine visits post-hospital discharge. It required additional flexibility in volunteer scheduling and lead-time. Additionally, the lead care coordinator took over as the telemedicine coordinator to keep services within APCC.

- *Addressing Social Determinants of Health.* CKRI has begun developing partnerships with community organizations to address social and economic circumstances that play a role in their clients' health. To gather more information from primary care patients about these social determinants of health, including food insecurity and housing, CKRI conducted a brief survey.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 31, 2015, CKRI had served a cumulative total of 143 unique direct participants since program launch. Enrollment in the CKRI APCC rose steadily through Q6 (October 1 through December 31, 2013), fell in Q7 (January 1 through March 31, 2014), leveled off through Q9 (July 1 through September 30, 2014), and then grew steadily for the remainder of the grant (see Exhibit CKRI.1).[37] During the most recent quarter for which data are available (October 1 through December 31, 2015), the program served 31 unique participants. About three-fourths of the participants are between 26 and 64 years old (74 percent), and 16 percent are between 65 and 74 years old. Forty-eight percent are female. Most participants are identified as White (77 percent), with smaller numbers identifying as Black (19 percent).

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



[37] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent CKRI self-reported data available is for HCIA reporting Quarter 14, for the time period October 1–December 31, 2015.

Summative Findings: Outcomes

We find a non-significant decrease in the total cost of care, estimated using Medicare claims, and a statistically significant decrease in the total cost of care, estimated using Medicaid claims. In the section below, we present our analyses of program effectiveness, based on three types of data: claims (both Medicare and Medicaid), survey data on beneficiary experience, and narrative from NORC interviews and site visit.[38]

Core Measures: Medicare

Our community (ambulatory care) analysis compares the experiences of CKRI enrollees with those of a matched group of comparators. It considers the impact on utilization and cost of the awardee's innovation over the enrollment period and in each quarter of program enrollment. Medicare FFS beneficiaries comprise approximately 23 percent of CKRI's enrolled beneficiaries.[39]

Measures (per 1,000 beneficiaries unless noted)
- Total Cost of Care per beneficiary
- Hospitalizations
- ED Visits

Finder File and Creation of Analytic Sample, Medicare. CKRI provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures. We identified 158 unique beneficiaries, and further limited this number by enrollment data and Medicare coverage, yielding an analytic sample of 66 beneficiaries.

Comparison Group, Medicare. We identified the comparison group in Medicare claims by using a list of qualified comparators from the Minnesota Department of Health (n=58,088) living in similar geographic regions in Minnesota. We used propensity score matching to find appropriate comparators.[40] The final propensity score model used includes age; gender; race/ethnicity; disability; HCC score; number of comorbidities; flags for depression, bipolar, and related disorders; prior-year utilization (hospitalizations, ED visits); and prior-year cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[41]

Descriptive Characteristics, Medicare. Exhibit CKRI.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison groups, with respect to demographics, risk score, and prior utilization.[42] Of the 66 beneficiaries enrolled for at least one quarter in any of the programs, just under one-half are male, and the majority are between 45 and 64 years of age (67 percent). Most beneficiaries are White (85 percent), and about 94 percent qualify for Medicare because of their disability. We observe no differences in demographics, comorbidities, or prior utilization measures between CKRI Medicare beneficiaries and the comparison group.

[38] CKRI serves all eligible patients regardless of payer. About half the population is dually eligible for Medicaid and Medicare, and these agencies pay for different services, e.g., Medicare is the first payer for inpatient stays, while Medicaid pays for first day of hospitalization and for emergency department (ED) visits. By using both data sets, we provide a more complete picture of use and cost.

[39] This estimate reflects awardee self-reported data for the HCIA reporting quarter October 1 through December 31, 2015.

[40] For more information on propensity score matching, please refer to Appendix C.

[41] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[42] We test differences between these groups with a t-test for continuous measures (HCC risk score and number of comorbidities and utilization before program enrollment) or a chi-square test for categorical parameters (gender, age, race, dual eligibility).

Exhibit CKRI.2: Descriptive Characteristics for CKRI and Comparison Group Medicare Beneficiaries

Variable	CKRI	Comparison
Number of Persons	66	66
Mean Number of Quarters Enrolled [Range]	7.1 [1-12]	7.1 [1-12]
Gender % (N)		
Male	48.5 (32)	45.5 (30)
Age Group % (N)		
18-25 years	4.5 (3)	1.5 (1)
26 to 44 years	18.2 (12)	27.3 (18)
45 to 64 years	66.7 (44)	66.7 (44)
>65 years	10.6 (7)	4.5 (3)
Race/Ethnicity % (N)		
White	84.8 (56)	83.3 (55)
Hierarchical Chronic Conditions (HCC) Risk Score		
Mean HCC Score (Standard Deviation)	2.5 (2.4)	2.2 (2.2)
Mean Count of HCCs (SD)	3.8 (3.8)	3.7 (3.7)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted**)**		
Total Cost of Care ($)	$30,971 ($64,357)	$27,820 ($55,746)
Hospitalizations	787 (1,731)	747 (1,528)
ED Visits	1,184 (2,642)	1,133 (2,594)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of CKRI, Medicare. Exhibit CKRI.3 presents the average quarterly and aggregate impact of the awardee's program for its participants relative to the comparison group.[43] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[44] We find the following, relative to the comparison group:

- **Cost:** A non-significant decrease in the total quarterly cost of care.
- **Utilization Measures**: No clear trends.

[43] Adjustment factors include age, gender, race/ethnicity, disability, HCC score, number of comorbidities; flags for depression, bipolar, and related disorders; prior-year utilization (hospitalizations, ED visits), and prior-year cost.

[44] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

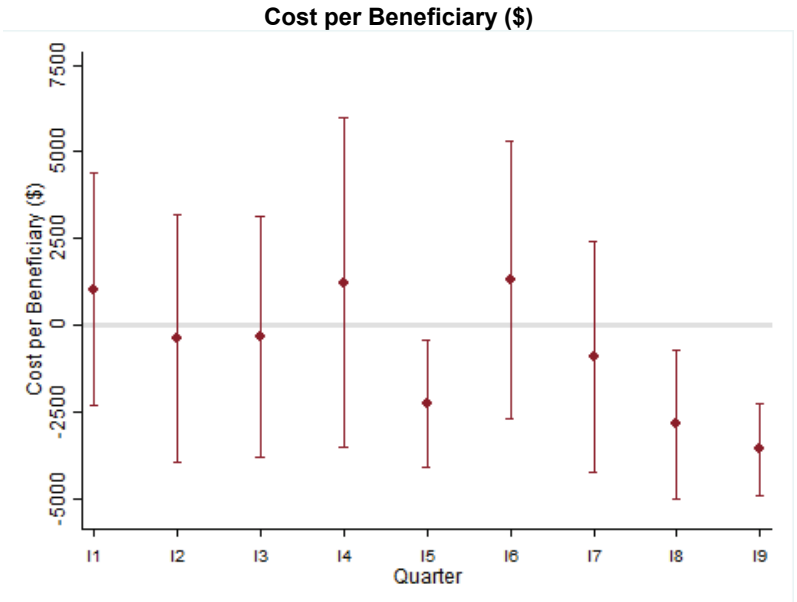
Exhibit CKRI.3: Impact of CKRI Program on Outcomes for Medicare Beneficiaries

IMPACT PER QUARTER§	
Outcome Measure (Per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary ($)	-$468 [-$2,585; $1,649]
Hospitalizations	21 [-35, 77]
ED Visits	10 [-46, 66]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	-$189,202 [-$1,044,536; $666,132]
Hospitalizations	8 [-15, 31]
ED Visits	4 [-19, 27]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. §: Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§: Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (66) and length of program implementation under analysis (up to 9 quarters).

Impact of Intervention in Each Quarter of Enrollment, Medicare. Findings from a quarterly fixed effects (QFE) DID model of impact in each intervention enrollment quarter are consistent with the *average* quarterly impact summarized above for hospitalizations and ED visits.[45] However, for total cost of care per beneficiary, the results of QFE DID models showed a statistically significant decrease in costs relative to the comparison group in post-implementation quarters five, and seven through nine of implementation. There were fewer participants with claims in later quarters, and those quarters receive less weight in the model. However, this is a promising trend for the small program.

Exhibit CKRI.4: Impact of CKRI Program on Outcomes for Medicare Beneficiaries, by Quarter



[45] The QFE DID the effect is displayed as the average difference (and 90 percent confidence interval) between intervention and comparison per 1,000 beneficiaries in each quarter.

Core Measures: Medicaid

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits

Our community (ambulatory care) analysis compares the experiences of CKRI enrollees with those of a matched group of comparators. It considers the impact on utilization and cost of the awardee's innovation over the enrollment period as a whole and in each quarter of enrollment. Our analysis is for Medicaid or dually eligible beneficiaries, comprising 87 percent of all CKRI enrollees.[46]

Finder File and Creation of Analytic Sample. CKRI provided a finder file of program participants and enrollment dates, enabling us to use Minnesota Medicaid claims to calculate outcome measures.[47] We identified 156 unique beneficiaries, and further limited this number by enrollment data, yielding an analytic sample of 136 beneficiaries.

We were able to match to Medicaid claims for 136 beneficiaries to calculate outcome measures. The file contained data on treatment participants and 61,431 comparison beneficiaries age 18 years to 80 years old. We then matched each of these individuals to Medicaid claims provided by the Minnesota Department of Health with claims data from the Minnesota Health Care Programs (MHCP).

Comparison Group, Medicaid. We identified the comparison group in Medicare claims using a list of qualified comparators from the Minnesota Department of Health (n=61,431) living in similar geographic regions in Minnesota. We use propensity score matching with Mahalanobis distance to find appropriate comparators.[48] The final propensity score model includes age; gender; race/ethnicity; disability; a measure of comorbidity using the Chronic Illness and Disability Payment System (CDPS) risk score; flags for depression, bipolar, and related disorders; prior-year utilization (hospitalizations, ED visits); and prior-year cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[49]

Descriptive Characteristics, Medicaid. Exhibit CKRI.5 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, CDPS risk score, and prior utilization.[50] Of the 136 beneficiaries enrolled for at least one quarter in any of the programs, about two-fifths are female, and about half are between 26 and 64 years of age (52 percent). Most beneficiaries are White (69 percent), and about 80 percent qualify for Medicaid because of their disability.

[46] Estimate percentage of dually eligible and Medicaid beneficiaries comes from awardee self-reported data. See Appendix C for more information about our analysis.

[47] Medicaid claims are available through December 31, 2015, for the analysis in this report.

[48] For more information on propensity score matching, please refer to Appendix C.

[49] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[50] We tested differences between the groups with a t-test for continuous measures (CDPS Risk Score and utilization before index hospitalization) and a chi-square test for categorical parameters (age, gender, race, ethnicity, coverage reason, and disability status).

Exhibit CKRI.5: Descriptive Characteristics for CKRI and Comparison Group Medicaid Beneficiaries

Variable	CKRI	Comparison
Number of Persons	136	130
Gender % (N)		
Female	44.1 (60)	43.8 (57)
Age Group % (N)		
18 to 25 years	31.6 (43)	27.7 (36)
26 to 64 years	52.2 (71)	55.4 (72)
>65 years	16.2 (22)	16.9 (22)
Race/Ethnicity % (N)**		
White	69.1 (94)	67.7 (88)
Black	25.0 (34)	18.5 (24)
Other	4.4 (6)	13.1 (17)
Coverage Reason % (N)		
Disability	78.7 (107)	81.5 (106)
Chronic Illness and Disability Payment System (CDPS)		
CDPS Risk Score (Standard Deviation)	3.3 (2.5)	3.4 (2.4)
CDPS Psychiatric Flags		
CDPS – bipolar affective disorder	16.9 (23)	17.7 (23)
CDPS – depression, panic or phobic disorder	14.0 (19)	14.6 (19)
Mean Utilization in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Cost of Care ($) per beneficiary *	$73,662 ($112,867)	$75,465 ($113,349)
Hospitalizations *	1,390 (2,572)	1,345 (2,542)
ED Visits	1,419 (2,899)	1,393 (2,792)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of CKRI Program, Medicaid. Exhibit CKRI.6 displays the average quarterly and aggregate impact of the CKRI program on its participants relative to the comparison group.[51] We find the following, relative to the comparison group:

- **Cost:** A statistically significant decrease in the total quarterly cost of care (-$1,943 per beneficiary).
- **Utilization Measures:** No clear trend in hospitalizations or ED visits.

[51] Adjustment factors are age, race/ethnicity, Medicaid coverage in lag year, dual coverage, CDPS risk score, managed care, and a disability indicator.

Exhibit CKRI.6: Impact of CKRI Program on Outcomes for Medicaid Beneficiaries

IMPACT PER QUARTER§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary ($)	**-$1,943 [-$3,862; -$24]***
Hospitalizations	-18 [-56, 20]
ED Visits	29 [-19, 77]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$1,696,476 [-$3,371,580; -$21,372]***
Hospitalizations	-15 [-48, 18]
ED Visits	25 [-17, 67]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. §Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. §§Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (136), with an average length of program enrollment of 7.1 quarters, ranging from 1-8 quarters.

Impact of Intervention in Each Quarter of Enrollment, Medicaid. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these results.

Quality of Care and Health: Survey and Qualitative-based Outcomes

NORC's survey of CKRI beneficiaries was presented in our Second Report to CMMI (2016); excerpts are presented below, supporting the conclusion that CKRI programs result in high-quality care and improved health among enrolled beneficiaries.[52]

Timeliness of Services Delivery. Most respondents (88 percent) report getting the help they need when they need it. Seventy percent of those who need help in the evenings and on weekends (N=43) are able to get it. Eighty percent have someone at CKRI whom they could call directly if they had health problems. Most (82 percent) feel that their doctor or nurse spends enough time with them during appointments.

Beneficiary Experience. Most respondents (81 percent) say that they are satisfied or very satisfied with their CKRI physician or nurse practitioner. Focus group participants expressed a high level of satisfaction with their care, the quality of staff, and their increased ability to manage their own care. Survey respondents expressed satisfaction with their care coordinator in particular, with the majority reporting that most or all of their providers understand what it is like to live with a disability and that most consider the financial, emotional, or other costs of their recommendations. Care coordinators and ILS workers played important roles by connecting participants to the services they needed. Several respondents said that care coordinators provide crucial help in scheduling appointments, coordinating tests and screenings, handling medications, and obtaining doctor's orders. Care coordinators also facilitated access to services including transportation, sign language services, physical therapy, medication management, and durable medical equipment.

[52] Please see NORC's Second Annual Report to CMMI for the complete set of survey findings.

Health. Almost all respondents feel that the care they receive at least partially improves their health (91 percent), and 71 percent feel that the care they receive helps them avoid medical emergencies.

Workforce Development

Staffing. The care team includes a physician (MD) or nurse practitioner (NP), and a registered nurse (RN). NPs and physicians who staff the clinic predate HCIA. The NP or physician serves as the care team leader, working with the client to prescribe the correct level and category of care. Additional resources and referrals are available within CKRI, such as physical therapists, psychologists, and pain management specialists. An ILS worker is also included as needed in the team to address the social health needs of the client. The ILS worker is a role that previously existed at CKRI but now serves an expanded population. In addition, clients have a care coordinator who plays a vital role in the care and management of their health, including education and preventive care. The clinic originally had social workers serve as care coordinators; now RNs fill the role. Care coordinators are part of the care team and serve as the primary contact with the client. They contact their clients at least quarterly to update care plans; conduct health promotion and client education; ensure that clients schedule and attend all necessary appointments, fill prescriptions and take their medications; and facilitate social support that aids in problem solving.

Staff members are generally very committed and carefully recruited to ensure they are a good fit for the program (e.g., have an understanding of the challenges faced by target population). Interviews with staff suggest a high level of satisfaction among care coordinators, who enjoy low turnover and working in a collaborative way with MDs/NPs, and especially ILS workers, who are perceived as integral to the model.

For the telemedicine component of the intervention, CKRI uses volunteers who bring equipment to the participant's home and visit weekly for one to two hours. Volunteers commit to remaining for a one-year period before training begins. Their role includes facilitating provider appointments, offering a social outlet for participants, and reporting any changes or concerns to the care team, which gives the care team further insight into the participant's condition and needs. The participant and the volunteer review the talking points that the participant wants to discuss with the provider during the appointment. Depending on the participant's comfort level, the volunteer may stay in the room for the telemedicine call or move to another room.

Training. The nurse care coordinators have informal and on-the-job training. CKRI provides limited specific training for RNs, relying on a careful hiring process to ensure care coordinators have relevant experience and are a good fit for the program. In the last year of the program, CKRI began providing additional training for RNs focused on behavioral health. They also added training for physicians and NPs. The telemedicine volunteer training involves five weeks of half-day trainings, which include lectures, guest speakers, and role-playing. The clinic provides shadowing opportunities to trainees on an ad-hoc basis. CKRI staff train volunteers on technical tasks such as taking blood pressure readings, as well as observation and note-taking skills. One focus of trainings is how to establish professional boundaries and relationships with their participants, while maintaining an enriching and friendly relationship.

As mentioned above, the behavioral health integration pilot increased staff capacity in behavioral health. Adoption of the Allina EHR system enabled RN care coordinators to do more work that aligns with their role and skill set rather than tracking down forms and records.

Context: CKRI In Its Third Year

After Courage Center merged with Sister Kenny Rehabilitation Institute in 2013 to form CKRI, which is operated by Allina Health, the organization's new leadership suspended new enrollments into the HCIA initiative as it took stock of operations. After the temporary moratorium on new enrollment, CKRI revised its implementation inclusion criteria to focus on serving patients with higher acuity mental health or behavioral health conditions.

Becoming part of a large health system gave CKRI access to larger internal resources and increased organizational capacity. As expected, there were also many smaller changes including new staff, new leadership, new technology, and new processes. For example, participants found contacting staff more difficult because they now were calling a central number and routed through a series of prompts. Considering the memory concerns of this patient population, this caused many problems. Participants perceived significant staff turnover during this time, but program staff felt that this was attributed to non-merger issues (such as insufficient time).

Sustaining, Replicating, and Scaling CKRI

From the outset, CKRI sought to develop a sustainable payment model for its disability medical home through new negotiated payment arrangements with public and private payers. CKRI has support for its program through a Medicaid demonstration. In addition, through Allina it is negotiating with commercial payers on payment approaches.

The opportunity to expand on a pilot program through HCIA allowed CKRI to develop a constructive partnership with the state, which enhanced opportunities for sustainability. Much of CKRI's sustainability efforts have focused on working with the Minnesota Department of Human Services (DHS), the state Medicaid agency. In 2015, CKRI joined Minnesota's Integrated Health Partnerships Initiative, a Medicaid ACO demonstration. This includes a risk-sharing contract with the state to serve individuals on Medicaid—including both fee-for-service (FFS) and managed care enrollees—who meet specific diagnostic criteria. The agreement does not include waiver or home and community-based services. CKRI is responsible for the cost of services that might otherwise be covered. CKRI's settlement falls under Allina Health's broader contract. While Allina is participating in the state's Medicaid demonstration, given the timing for finalizing contracts, Allina will not see any shared savings until 2017. Allina may be part of state Medicaid demonstration for dually eligible beneficiaries in 2017.

While Integrated Health Partnerships does provide one avenue for sustainability, long-term sustainability of the care model will require a multipayer approach. Allina payer relations staff is working toward integrating CKRI health care home requirements into discussions with payers, 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. CKRI worked with an external consultant to develop a sustainability plan to help market the clinic to both

organizational leadership and commercial payers, including documented cost savings and patient satisfaction from the CKRI model.

CKRI continues to identify support to sustain the intervention while it negotiates new payment arrangements with both Medicaid and private payers. This includes internal Allina support, Courage Kenny Foundation support, and outside funder support. Courage Kenny leadership is committed to continuing to provide independent living services to persons living with a disability who are not eligible for the Medicaid waivers.

Currently there is only one site for Courage Kenny's Advanced Primary Care Clinic. The clinic is part of the larger Courage Kenny facility and services, which is the result of mergers between the Courage Center, Sister Kenny, and Allina Health. One of CKRI's goals is to disseminate the health care home model. CKRI and Allina leadership are reviewing results of the HCIA intervention with an eye towards potential opportunities to scale and spread within and outside Allina.

Summary

CKRI experienced numerous changes over the course of the award period, which dramatically affected implementation. An organizational merger slowed the roll-out of the program, but also provided access to larger internal resources, increased organizational capacity, and facilitated referrals and coordination with providers. EHR adoption during the final year of the award changed the way care coordinators spend their time, increasing efficiencies and capacity. It also facilitated integration into the broader Allina system, which increased referrals to the clinic and completed the continuum of care.

With respect to outcomes, we observed a statistically significant reduction in total cost of care for CKRI Medicaid program participants, relative to a comparison group. These cost reductions may be due to enhanced patient engagement and care coordination provided by the CKRI medical home, and facilitated by improved self-care skills and new independent living skills training. We also observed greater reductions in cost starting in year two after program enrollment. We did not observe reductions in cost of care for Medicare beneficiaries, but this may be due to a lack of statistical power because of the small sample size. We found no clear trends for hospitalizations or ED visits for Medicaid or Medicare beneficiaries, though our analysis suggests the program is reducing length of stays for hospital admissions. Results reflect up to two years of program participation. However, these findings should be interpreted with caution, due to the small sample size and considerable variability in the data.

References

HCIA Narrative Progress Report for Courage Kenny Rehabilitation Institute, for Reporting Quarter End Date 6/30/2015. Submitted by CKRI, 6/30/2015.

HCIA Quarterly Report for CKRI, for Reporting Quarter End Date 6/30/2015. Submitted by CKRI, 8/31/2015.

HCIA Narrative Progress Report for Courage Kenny Rehabilitation Institute, for Reporting Quarter End Date 9/30/2015. Submitted by CKRI, 12/09/2015.

HCIA Quarterly Report for CKRI, for Reporting Quarter End Date 9/30/2015. Submitted by CKRI, 12/09/2015.

HCIA Narrative Progress Report for Courage Kenny Rehabilitation Institute, for Reporting Quarter End Date 12/31/2015. Submitted by CKRI, 1/28/2016.

HCIA Quarterly Report for CKRI, for Reporting Quarter End Date 12/31/2015. Submitted by CKRI, 3/02/2016.

HCIA Narrative Progress Report for Courage Kenny Rehabilitation Institute, for Reporting Quarter End Date 3/31/2016. Submitted by CKRI, 4/29/2016.

HCIA Quarterly Report for CKRI, for Reporting Quarter End Date 3/31/2016. Submitted by CKRI, 06/01/2015.

Developmental Disabilities Health Services

Developmental Disabilities Health Home. Clinic-based teams, led by a nurse practitioner (NP), deliver primary care, mental health services, and specialty care to persons with intellectual and/or developmental disabilities (I/DD).

PROGRAM MODELS: Disability Medical Home, Care/Case Coordination, Integrated Care Delivery, Patient Navigation

LOCATION: New York, New Jersey
GRANT: $3,701,525
AWARD DATES: 1/15/13 to 12/31/15
NO-COST EXTENSION: 6 month, full program
PAYER(S): Medicare, Medicaid

REACH: 735 beneficiaries (95% of target)§
POPULATIONS: Disability, Dually Eligible
DATA: Medicare claims (01/13-3/16); awardee consumer survey (2014); one site visit (2014); telephone interviews with leadership (2014 to 2016)

- Recruiting NPs who were willing and able to specialize in the I/DD population was both challenging and essential.
- Program has high workforce retention and staff satisfaction.

- Interdisciplinary team comprising NPs and physicians provide integrated primary care, mental health, and specialty medical care services.

- Lack of Medicaid capitation in New Jersey constrained implementation and prospects for sustainability.

OUTCOMES§§

- Findings not statistically significant

- Decrease in emergency department visits per quarter (-57 per 1,000 beneficiaries, Medicaid)

- 98% of survey respondents rate the overall quality of their health care visit to be above average or excellent.
- Participants report improved access to care, care delivery, and improved management of their health since enrolling in the DDHS intervention.

Analysis limited due to small sample sizes and to lack of Medicaid claims data for New Jersey.

SUSTAINABILITY, REPLICABILITY, & SCALING

Establishing capitated agreements with payers has posed a challenge for the program. The program showed resilience in its efforts to find a path to sustainability, developing two sets of sustainability strategies for its implementation sites: one for sites located in New York and another for those in New Jersey.

The implementation experience of the New Jersey sites indicates that it would be difficult to translate this intervention to an environment where payment for I/DD services is primarily fee-for-service.

§Target is for initial performance period, through 6/30/2015. §§Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the p<0.10 level. Outcomes for quality of care are from NORC analysis of awardee's consumer/caregiver survey data.

Overview of Developmental Disabilities Health Services

Background. Developmental Disabilities Health Services (DDHS) is a specialized health care and care management provider for people with intellectual and developmental disabilities (I/DD) who receive Medicaid and/or Medicare benefits. DDHS leadership has a long-standing history with the target population and program model, having first implemented the program—known as "the Morristown model"—in 1982 within a community hospital.[53] Prior to the Innovation Award, DDHS provided integrated care services at two independent, community-integrated physician offices in New Jersey, serving approximately 500 patients. Through the Innovation Award, DDHS expanded its developmental disabilities health home model, which provides integrated primary care, mental health, and specialty medical care services through care teams made up of nurse practitioners (NPs) and physicians, to six clinic sites—four in New Jersey and two in New York. DDHS was able to maintain its model consistently between implementation sites, in part thanks to well-versed staff. DDHS previously demonstrated improvements in clinical outcomes, as well as cost savings related to decreased numbers of emergency department (ED) visits and acute care hospitalizations.[54]

Goals. DDHS aims to coordinate mental health services (behavioral and psychiatric) with primary care and some specialty medical care, such as neurology, for young adults and adults with I/DD. The goal of care coordination is to achieve improved care and health outcomes for the target population, as well as cost savings in overall medical care spending. DDHS tracks its performance on clinical, functional health, mental health, and satisfaction measures, derived from both electronic medical records and direct survey data collection.

Program Model and Practices. The awardee's integrated primary care model combines the skills of an NP to deliver standard primary care services with those of a physician who is trained in psychiatry and has specialized medication knowledge and experience working with individuals with I/DD. The NP serves as the team leader, managing and providing the majority of patient care. The physician's role is to be available for consultations or more complex decisions. In order to avoid agitating patients with I/DD, the entire staff works to provide accommodating, patient-centered office visits with little to no wait for patients.

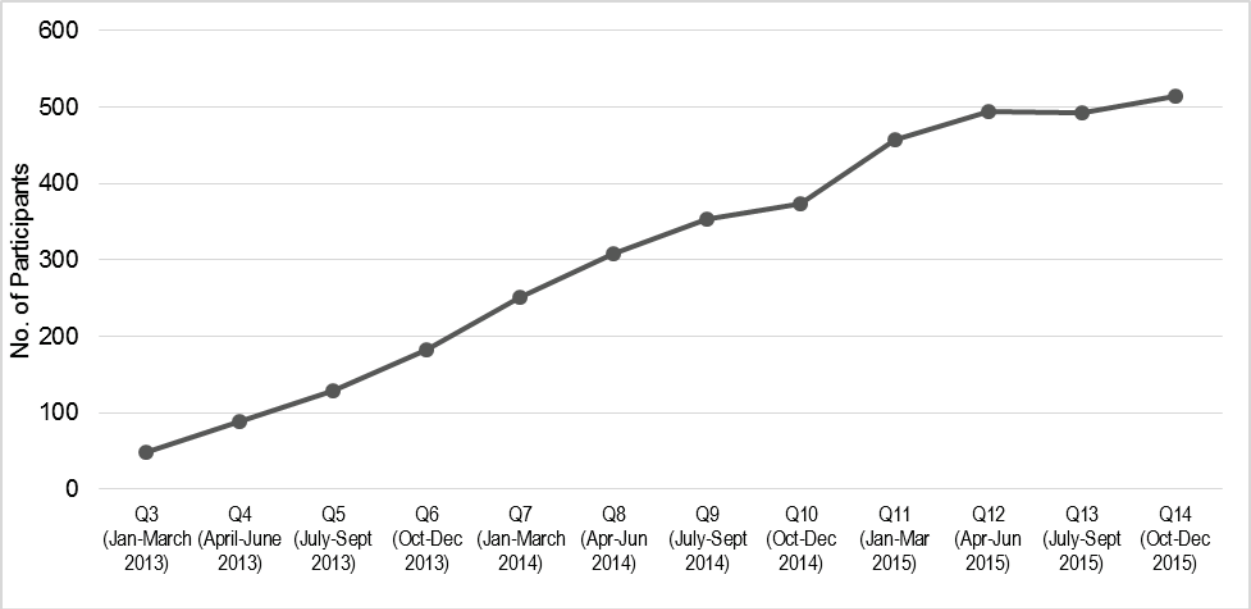
Implementation Updates. DDHS experienced slower than expected recruitment in New Jersey due to challenges in establishing capitated contracts with New Jersey Medicaid managed care organizations (MCOs). Without a contract, MCOs did not recognize the DDHS as an in-network provider. As a result, they could not bill for services provided for patients. Additionally, patients were reluctant to join the program without knowing the terms of their coverage. According to the awardee, DDHS's difficulty in signing a contract with MCOs was due to a lack of interest in capitated contracts on the part of the MCO. The regional MCOs claimed that they already had adequate networks in place and did not need additional I/DD providers. Without support from Medicaid plans, DDHS faced challenges in securing reimbursement for its program.

[53] Ziring, P.R., Kastner, T.A., Friedman, D.L., et al. 1988. Provision of health care for persons with developmental disabilities living in the community. The Morristown model. *Journal of the American Medical Association* 260(10):1439-44.

[54] Kastner, T. A., & Walsh, K. K. (2012). Health Care for Individuals with Intellectual and Developmental Disabilities: An Integrated DD Health Home Model. In: R.M. Hodapp (Ed.), *International Review of Research in Developmental Disabilities* (pp. 1–45).

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from DDHS show participation by HCIA reporting quarter, as shown in Exhibit DDHS.1. Counts are for patients who received services from staff trained or employed under the HCIA award but whose employment was not directly funded by the award. The data show a steady increase over time. During the most recent quarter for which data are available (October 1 through December 31, 2015), the program served 514 patients.

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



Summative Findings (Outcomes)

DD Health Home is associated with a statistically significant decrease in ED visits, as estimated using the Medicaid claims.

In the section below, we present our analyses of program effectiveness, based on three types of data: Medicare Fee-For-Service (FFS) and Medicaid claims, surveys from DDHS's internal survey of participants, and narrative from NORC interviews and one site visit.

Core and Supplemental Measures: Medicare

Our community (ambulatory care) analysis compares the experiences of DDHS enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of DDHS patients over the enrollment period as a whole and in each quarter of enrollment. Our analysis is for Medicare FFS beneficiaries, comprising 4 percent of all DDHS enrollees.[55]

[55] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

Finder File and Creation of Analytic Sample, Medicare Analysis. DDHS provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[56] We identified 403 unique beneficiaries and further limited this number by enrollment date, Medicare identifiers, and chronic conditions, yielding an analytic sample of 349 beneficiaries.

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- 30-day Hospital Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Comparison Group, Medicare Analysis. The comparison pool consists of non-institutionalized Medicare FFS patients in the same states—New Jersey and New York—as DDHS program participants. We directly match comparison beneficiaries to DDHS patients based on state of residence, age, and race. We use propensity score matching to find appropriate comparators within each strata of exact matching.[57] The final propensity score model includes age; race; gender; dual eligibility; Chronic Illness and Disability Payment System (CDPS) risk score; indicators for developmental disability diagnosis and psychiatric diagnosis; an indicator for depression; and prior-year utilization (ED visits and hospitalizations) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[58]

Descriptive Characteristics, Medicare Analysis. Exhibit DDHS.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, CDPS risk score, and prior utilization.[59] We observe no differences in demographics, CDPS risk score, or prior utilization measures.

Exhibit DDHS.2: Descriptive Characteristics for DD Health Home and Comparison Group Medicare Beneficiaries

Variable	DDHS	Comparison
Number of Beneficiaries	349	349
Mean Number of Quarters Enrolled [Range]	6.7 [1-11]	6.7 [1-11]
Gender % (N)		
Female	38.7 (135)	39.0% (136)
Age Group % (N)		
<30 years	7.7 (27)	7.7 (27)
30-39 years	15.5 (54)	15.5 (54)
40-49 years	18.3 (64)	18.3 (64)
50-59 years	34.4 (120)	34.4 (120)
≥60 years	24.1 (84)	24.1 (84)

[56] Medicare claims are available through March 31, 2016, for the analysis in this report. We use December 31, 2015, as the cut-off date to account for the 90-day claims runoff.

[57] For more information on propensity score matching, please refer to Appendix C.

[58] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[59] We test differences between these groups with a t-test for continuous measures (CDPS risk score and utilization before index hospitalization) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, and coverage reason).

Variable	DDHS	Comparison
Race/Ethnicity % (N)		
White	73.9 (258)	73.9 (258)
Black	18.3 (64)	18.3 (64)
Other	7.7 (27)	7.7 (27)
Coverage Reason % (N)		
Age	1.4 (5)	1.1 (4)
Disability	98.6 (344)	98.9 (345)
Chronic Illness and Disability Payment System (CDPS) Risk Score		
Mean CDPS Risk Score (Standard Deviation)	1.8 (1.1)	1.8 (1.3)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted**)**		
Total Medicare Cost (SD)	$6,242 ($10,194)	$6,203 ($11,357)
Hospitalizations (SD)	237.8 (637.1)	243.6 (630.4)
ED Visits (SD)	1,163.3 (1872.1)	1,235.0 (2514.7)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of DDHS intervention, Medicare. Exhibit DDHS.3 displays the average quarterly and aggregate impact of DDHS's approach on its participants relative to the comparison group.[60] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[61] We find the following for DDHS patients, relative to the comparison group:

- **Cost:** A non-significant increase in total quarterly cost of care.
- **Utilization Measures:** Small, nonsignificant increases in hospitalizations and 30-day readmissions per quarter and no impact on ED visits per quarter.
- **Quality of Care:** No impact on ambulatory care-sensitive (ACS) hospitalizations.

[60] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, dual eligibility indicator, CDPS risk score, and disability indicator.

[61] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit DDHS.3: Impact of DD Health Home Program on Outcomes for Medicare Beneficiaries

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	$320 [-$190; $830]
Hospitalizations	8 [-12, 28]
ED Visits	0 [-27, 27]
30-Day Readmissions	48 [-45, 141]
ACS Hospitalizations	0 [-5, 5]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$738,047 [-$439,661; $1,915,755]
Hospitalizations	18 [-29, 65]
ED Visits	1 [-62, 64]
30-Day Readmissions	5 [-5, 15]
ACS Hospitalizations	1 [-11, 13]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (349), with an average length of program enrollment of 6.7 quarters, ranging from 1-10 quarters.

Impact of DDHS Intervention in Each Quarter of Enrollment, Medicare. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: Medicaid Analysis, New York

Our community (ambulatory care) analysis compares the experiences of DDHS enrollees with those of a matched group of comparators. It considers the impact on utilization and cost of the awardee's DD Health Home innovation over the enrollment period as a whole and in each quarter of enrollment. Medicaid beneficiaries represent more than 90% of all DDHS enrollees, However, our analysis is for Medicaid beneficiaries in the DDHS program comprising 14 percent of all DDHS enrollees.[62]

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits

Finder File and Creation of Analytic Sample, Medicaid. DDHS provided a finder file of program participants and enrollment dates, enabling us to use Alpha-MAX Medicaid claims for these beneficiaries to calculate outcome measures for only New York participants.[63] We identified 211 unique beneficiaries and further limited this number by enrollment date, Medicaid identifiers, yielding an analytic sample of 104 beneficiaries.

[62] Estimated percentage of Medicaid participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[63] Alpha-MAX claims are available through December 31, 2014, for the analysis in this report.

Comparison Group, Medicaid Analysis. The comparison pool consists of non-institutionalized Medicaid patients in New York, one of two states where DD Health Home program participants reside. We directly match comparison beneficiaries to DD Health Home participants based on managed care enrollment, gender, race, and age. We use propensity score matching to find appropriate comparators.[64] The final propensity score model includes age, race, gender, enrollment in managed care, dual eligibility, CDPS risk score, indicators for developmental disability diagnosis and psychiatric diagnosis, and prior-year utilization (ED visits and hospitalizations) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[65]

Descriptive Characteristics, Medicaid Analysis. Exhibit DDHS.4 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, CDPS risk score, and prior utilization.[66] We observe no differences in demographics, CDPS risk score, or prior utilization measures.

Exhibit DDHS.4: Descriptive Characteristics for DD Health Home and Comparison Group Medicaid Beneficiaries

Variable	DDHS	Comparison
Number of Beneficiaries	104	104
Mean Number of Quarters Enrolled [Range]	3.9 [1-7]	3.9 [1-7]
Gender % (N)		
Female	40.4 (42)	40.4 (42)
Age Group % (N)		
<30 years	47.1 (49)	47.1 (49)
30-39 years	18.3 (19)	18.3 (19)
40-49 years	13.5 (14)	13.5 (14)
50-59 years	16.3 (17)	16.3 (17)
≥60 years	4.8 (5)	4.8 (5)
Race/Ethnicity % (N)		
White	51.9 (54)	51.9 (54)
Black	33.7 (35)	33.7 (35)
Other	14.4 (15)	14.4 (15)
Dual Eligibility % (N)		
Dual Enrolled	39.4 (41)	40.4 (42)
CDPS Risk Score		
Mean CDPS Risk Score (SD)	2.2 (1.3)	2.1 (1.3)

[64] For more information on propensity score matching, please refer to Appendix C.

[65] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[66] We test differences between these groups with a t-test for continuous measures (CDPS risk score and utilization before index hospitalization) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, Medicaid coverage, and CDPS diagnoses).

Variable	DDHS	Comparison
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD)	$113,336 ($84,791)	$117,393 ($195,120)
Hospitalizations (SD)	260 (591)	250 (603)
ED Visits (SD)	1,058 (1,677)	1,087 (2,883)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of DD Health Home Program, Medicaid Analysis. Exhibit DDHS.5 displays the average quarterly and aggregate impact of the DD Health Home innovation on its participants relative to the comparison group.[67] We present a limited analysis of the Medicaid beneficiary experience that only includes NY participants. Please interpret these findings with caution.We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[68] We find the following for the DD Health Home program, relative to the comparison group:

- **Cost:** A non-significant increase in total quarterly cost of care.
- **Utilization Measures:** A statistically significant decrease in ED visits per quarter (-57 per 1,000 beneficiaries) and a small non-significant decrease in hospitalizations per quarter.

Exhibit DDHS.5: Impact of DD Health Home Program on Outcomes for Medicaid Beneficiaries

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	$1,982 [-$4,303; $8,267]
Hospitalizations	-21 [-53, 11]
ED Visits	**-57 [-102, -12]****
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$693,719 [-$1,506,200; $2,893,638]
Hospitalizations	-7 [-18, 4]
ED Visits	**-20 [-36, -4]****

NOTE: *p<0.10, **p<0.05, ***p<0.01. §Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program enrollment. §§Aggregate Impact is the total difference-in-differences estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (104), with an average length of program enrollment of 3.9 quarters, ranging from 1-5 quarters.

Impact of DD Health Home Program in Each Quarter of Enrollment, Medicaid. Findings from a QFE DID model of impact for total cost of care and ED visits are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Quality of Care and Health (Survey and Qualitative Findings)

NORC's assessment of quality of care and health is based on our analysis of patient satisfaction survey data collected by DDHS; the awardee's questionnaire included new items added at NORC's request. The

[67] Adjustment factors include age category, gender, race/ethnicity, dual eligibility, managed care coverage indicator, and CDPS risk score.

[68] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

findings below represent survey data collected from September 2014 through June 2015 (N=182), from beneficiaries enrolled in the DDHS health home model; 78 percent of respondents received assistance from a proxy in answering the survey. While DDHS integrates both mental health and neurological care with primary care, 79 percent of respondents report using the program for just one of these services. Overall, most respondents express a high level of satisfaction with various aspects of their care, noting improved access to care, care delivery, and improved management of their health since enrolling in the DDHS intervention. See Appendix F for a full presentation of survey findings.

Timeliness of Services Delivery. Almost all respondents say that their phone calls are handled effectively (94 percent), that emergencies are handled efficiently (92 percent), that prescription refills are handled smoothly (92 percent) and that they are able to get help on evenings and weekends when needed (82 percent).

Beneficiary Experience. More than three-quarters of respondents find the facility easy to get to, and ninety-eight (98) percent rate quality of the experience as above average or excellent. Nearly all respondents (99 percent) report that program staff work cooperatively to solve their health issues and almost as high a percentage report that office staff were knowledgeable and courteous (94 percent) and that staff listened to the respondent and treated him/her like a person (94 percent).

Health. Seventy-one (71) percent believe their health has improved during the last year. Most respondents (85 percent) also report feeling more confident in managing their own health and having fewer problems with their medications (90 percent).

Workforce Development

Staffing. The DDHS model is based on an interdisciplinary partnership between NPs and physicians. NPs fill multiple roles in the model, functioning as team leaders, clinicians, and case managers/care coordinators. These NPs also have access to physician specialists to support their clinical practice, but the enhanced role of the NPs allows physicians to focus primarily on the health of the entire patient panel. Participating NPs and physicians expressed high levels of satisfaction with the program, and DDHS has experienced relatively low staff turnover. The participating NPs attribute this largely to self-selection for the position, which attracts providers who enjoy professional autonomy and the opportunity to work with this patient population.

Training. DDHS conducted minimal training. The majority of NPs recruited for the program had substantial experience in the field, and many had worked previously with this target population. Upon hiring, staff members participate in a one-time course titled “Introduction to Developmental Disabilities,” which consists of assigned reading and discussion. However, low turnover resulted in a decreased need to train new staff. Continuing clinical training consists primarily of one-on-one training. This training exposes NPs to a specialized set of primary care practice guidelines on intellectual and developmental disabilities. Nonclinical training for all staff includes instruction on gathering and submitting self-monitoring data to the innovation center, as well as using and managing the program’s electronic health record (EHR) system.

Impact of Workforce Development. Workforce development has not been a primary focus of this awardee, largely because the program began with a staff that was trained and experienced in this area, serves a relatively small patient population, and has experienced little staff turnover. However, participating providers have expressed satisfaction with the training that they received to improve their skills in serving this vulnerable population. The awardee notes that finding an NP who is willing and able to specialize in the I/DD population has been a unique workforce challenge, saying, "There is not a steady supply of nurses or NPs. You have to make them."

Context: DDHS in its Third Year

External Context. The Medicaid environment in which DDHS operates—especially in New Jersey—has significantly affected implementation of the program. The awardee notes that its interaction with the Medicaid program in New Jersey has been particularly complicated, given the shift to Medicaid managed care. DDHS has found that managed care networks do not include providers who serve patients with I/DD. As noted in NORC's Second Annual Report to CMMI (2016), a change of leadership at a health plan partner in New Jersey resulted in the withdrawal of the capitated contract for DDHS services. In response, DDHS leadership created new partnerships and connections around the state, and also accepted a FFS contract. Three New Jersey MCOs decided to reimburse for the care of patients with I/DD on a FFS basis. While the FFS agreement was not in line with the original award model, it did allow the awardee to serve additional participants. The clinical structure of the DDHS model calls for providers to plan for visits that are longer than most office consultations in order to create extra time for dialogue, patient input, and teach-back methods. Under a FFS payment system, this model is not likely to produce cost savings. DDHS did not encounter these issues in New York, where MCO enrollment is not mandatory.

Internal context. The program found a better foothold in New York through the Albert Einstein Medical Center (AEMC) and Montefiore Medical Center. The DDHS clinic at AEMC has been integrated wholly into the Children's Evaluation and Rehabilitation Center (CERC). It has been easier to establish care management aspects of the intervention in this location because care managers, doctors, behaviorists, and other specialists are co-located in the same clinic building, which facilitates communication and coordination.

Sustaining, Replicating, and Spreading Innovation: DDHS

Sustainability. The program showed resilience in its efforts to find a path to sustainability. It approached various HMOs and explored a variety of contracting options, including Medicaid FFS and capitated arrangements. The awardee developed two sets of sustainability strategies for its implementation sites: one for New York sites and another for those in New Jersey.

As discussed above, DDHS found inadequate networks within New Jersey Medicaid for patients with I/DD to be a major challenge. It also found that payers did not recognize the need for a service like the DDHS program, so finding or creating a capitated agreement became a roadblock. The intervention, designed to provide integrated care that emphasizes unhurried patient consultations, medication management, and prevention, is largely inconsistent with a FFS payment model. Initially, a payer had agreed to contract with DDHS. However, this partner dropped out and was unwilling to renegotiate another capitated contract.

In New York, DDHS will be sustaining its program in the AEMC environment, in part because the president of DDHS has become part of the AEMC leadership. DDHS is seeking to scale operations by increasing patient enrollment in its Montefiore Medical Center clinic, an ACO that operates under a capitated payment model.

Replicability and Scaling . The absence of a comprehensive training program could pose a challenge to replicating this intervention in other environments, where there may be a shortage of clinical staff experienced with patients with I/DD. In addition, because the NP training was mainly experiential, the awardee does not have replicable, formal training materials for I/DD training. The DDHS training also assumes some familiarity with the target population, and would need to be adapted for NPs that do not have experience with patients with I/DD.

The awardee notes that the political environment is also a major factor for replication of this model, saying, *"Going to HMO MCO, they would only do FFS, and you can't build a medical home for I/DD patients under that model."* In addition, the DDHS experience has also underscored the importance of capitated payer arrangements. The implementation experience of the New Jersey sites indicates that it would be difficult to translate this intervention to an environment where payment for I/DD services is primarily FFS. Organizations considering implementation of similar models must consider the payment structure and I/DD policy environments in their state.

Summary

Our claims-based findings are mixed for DDHS. Analyses of the Medicaid claims data identify a significant decrease in ED visits in the post-intervention period; however, we observe non-significant increases in total cost of care in the post-intervention period in both data sources, relative to the comparison group. Given the importance of capitation to sustain this model, the demonstration of cost savings using Medicare FFS claims may not be adequate to promote take-up of the DDHS model. We encourage readers to interpret these results with caution due to small sample sizes. In addition to sample size, key limitations for both analyses include small percentage of overall population represented (less than 30 percent), limited follow-up time, and absence of New Jersey Alpha-MAX data.

Overall, our findings show high levels of both participant and provider satisfaction with DDHS. Enrolled beneficiaries had a favorable view of the program, noting improved access to care, care delivery, and improved management of their health since enrolling in the intervention. Similarly, although workforce development was not a primary focus of this intervention, NPs and physicians expressed high levels of satisfaction with the program, and DDHS has experienced relatively low staff turnover during the intervention. However, because DDHS provides limited training for participating staff, the availability of trained and experienced staff committed to serving the I/DD population was an important factor in the success of the implementation of the intervention. Finally, establishing capitated contracts was a significant barrier to this intervention. Because the program focuses largely on prevention and was specifically designed to provide integrated care and services such as medication management, it was largely inconsistent with a FFS payment model. Finding or creating capitated agreements was crucial to program implementation.

References

HCIA Narrative Progress Report for Developmental Disabilities Health Services, for Reporting Quarter End Date 9/30/2015. Submitted by DDHS, 10/27/2015.

HCIA Quarterly Report for DDHS, for Reporting Quarter End Date 9/30/2015. Submitted by DDHS, 12/09/2015.

Johns Hopkins University Community Health Partnership

Community Health Partnership (J-CHiP). This program has two components: a hospital and skilled nursing facility post-acute care (PAC) intervention, and a clinic-based (community) intervention. Both arms focus on increasing access to primary care and behavioral health care services, and quality of care for high-utilizing, high-risk patients who live in neighborhoods close to the awardee.

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Care/Case Coordination, Collaborative Medical Home, Transitional Care

LOCATION: Baltimore, MD

GRANT: $19,920,338

AWARD DATES: 7/01/12 to 6/30/16
NO-COST EXTENSION: 12 month, community arm

PAYER(S): Medicare, Medicaid

REACH: 80,257 beneficiaries (106% of target)[§]
POPULATIONS: Adults, Behavioral Health/Substance Abuse, Dually Eligible, Racial/Ethnic Minority, Urban
DATA: Medicare claims (1/11-3/16); Medicaid claims (1/11-3/15); patient survey (11/14-3/15); two site visits (3/14, 3/15); telephone interviews with leadership (2014 to 2016)

OUTCOMES, Hospital Arm[§§]

COST
- Reduction in 90-day total cost of care (-$1,115 per beneficiary-episode, Medicare)
- Reduction in 90-day total cost of care (-$4,987 per beneficiary-episode, Medicaid)

UTILIZATION
- Increase in 90-day hospitalizations and 30-day readmissions and (11 and 14 per 1,000 beneficiary-episodes per quarter, respectively, Medicare)
- Decrease in 90-day ED visits (-134 per 1,000 beneficiary-episodes per quarter, Medicaid); increase in 90-day hospitalizations (53 per 1,000 beneficiary-episodes per quarter, Medicaid)

QUALITY
- Decrease in 7-day and 30-day practitioner follow-up visits post-discharge (-41 and -29 per 1,000 beneficiary-episodes per quarter, respectively, Medicare)
- Decrease in 30-day and 7-day practitioner follow-up visits post-discharge (-70 and -184 per 1,000 beneficiary-episodes per quarter, respectively, Medicaid)

OUTCOMES, Community Arm[§§]

COST
- Reduction in total quarterly cost of care (-$1,756 per beneficiary, Medicaid)

UTILIZATION
- Decrease in hospitalizations and ED visits (-17 and -16 per 1,000 Medicare beneficiaries per quarter, respectively)
- Decrease in hospitalizations and ED visits (-31 and -48 per 1,000 Medicaid beneficiaries per quarter, respectively)

QUALITY
- Decrease in avoidable hospitalizations (-7 per 1,000 Medicaid beneficiaries per quarter)

HEALTH
- 82% of respondents report that they spoke with clinic staff about how to take care of themselves
- Most respondents report that they trust their community health worker (CHW) and would recommend their provider to family and friends

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

The awardee's hospital arm has continued without HCIA funding. Maryland's global budget revenue payment policy, overseen by the Health Services Cost Review Commission (HSCRC), will help fund some of the PAC components through increased hospital rates. HSCRC recently awarded a planning grant to the Johns Hopkins Health System to help develop a regional health partnership in Baltimore to support the community intervention arm. Johns Hopkins hopes to receive funding by mid-summer 2016.

REPLICABILITY & SCALING

The hospital arm may be expanded to focus on certain critical populations that are underserved based on evaluation data. There are plans to expand the J-CHiP Community component to 14 additional zip codes in Baltimore using funding from HSCRC for a regional partnership.

[§]Target is for initial performance period, through 6/30/2015. [§§]Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and are statistically significant at the p<0.10 level. Outcomes for quality of care and health outcomes are from NORC's analysis of the awardee's consumer survey and NORC focus groups and interviews. This front page summary of the J-CHiP awardee chapter includes findings based on NORC's original analyses. The awardee chapter includes quality of care and health outcomes that represent the original work of the awardee; however, only findings developed by NORC are included in this front page summary.

Overview of the Johns Hopkins Community Health Partnership Program

Background. The multifaceted components of the Johns Hopkins Community Health Partnership Program (J-CHiP) build on internal pilots and ongoing programming that were in place prior to the award. These include daily multidisciplinary rounding, early risk-screening for complex discharge needs,[69] and Project Sugar,[70] a program that recruits and promotes the health of Black or African Americans with diabetes. The J-CHiP initiative works under the auspices of Johns Hopkins University in collaboration with affiliated organizations, including Johns Hopkins HealthCare, LLC (a health plan); Johns Hopkins Community Physicians (who staff some of the clinics); and Priority Partners, a managed care organization (MCO). It has marshalled considerable institutional support and buy-in both in the Hopkins community and the Baltimore community it serves. J-CHiP has a Community Advisory Board to help ensure that the J-CHiP mission and programmatic elements are in line with the needs and priorities of the community.

J-CHiP includes two arms: an acute care and a transitional intervention (PAC or hospital arm), including discharge to skilled nursing facilities (SNF); and a clinic and community-based intervention arm. While the acute care intervention provides services to all patients, the community intervention focuses predominantly on high-risk, high-utilizing Medicare and Medicaid patients. J-CHiP's hospital arm provides care coordination services for patients discharged from two hospitals—the Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, in partnership with five SNFs. J-CHiP's community arm provides coordination and enhanced primary care services for high-risk patients who receive services in East Baltimore, in partnership with eight community clinics staffed with multidisciplinary teams. J-CHiP also works with two community organizations, Sisters Together and Reaching (STAR), and the Men and Families Center (M&FC), to provide direct patient outreach and supportive services, including care management, to targeted patients and neighborhoods. The work of these organizations is referred to as Tumaini (Hope) for Health ("Tumaini" is Swahili for "hope").

Goals. In addition to addressing the CMMI core measures of all-cause hospital admissions, hospital readmissions, emergency department (ED) visits, and total cost of care, J-CHiP's hospital arm focuses on improving quality and reducing avoidable hospitalizations. The community arm seeks to reduce complications and increase access to care and use of primary care services.

Program Models and Practices. As described in NORC's First Annual Report to CMMI (2014), the J-CHiP program is one of the most extensive and diverse programs in the HCIA portfolio of awards that target complex, high-risk patients. It includes many program models in both intervention arms.

- **Hospital arm:** Components include multidisciplinary rounding to coordinate patient care and transition of care; a Meds for Home Program and pharmacy extenders to increase the number of patients who leave the hospital with their post-discharge medications in hand; post-discharge home visits by transition guide nurses for high-risk patients or post-discharge phone calls by a nurse as part of a Patient Action Line (PAL); and patient education at multiple points throughout hospitalization and post-discharge.

[69] Dedhia P., et al. A quality improvement intervention to facilitate the transition of older adults from three hospitals back to their homes. *Journal of the American Geriatrics Society* 2009, vol. 57(9): 1540-6.

[70] Gary T.L., et al. A randomized controlled trial of the effects of nurse case manager and community health worker team interventions in urban African-Americans with type 2 diabetes. *Controlled Clinical Trials* 2003, vol. 25L: 53-66.

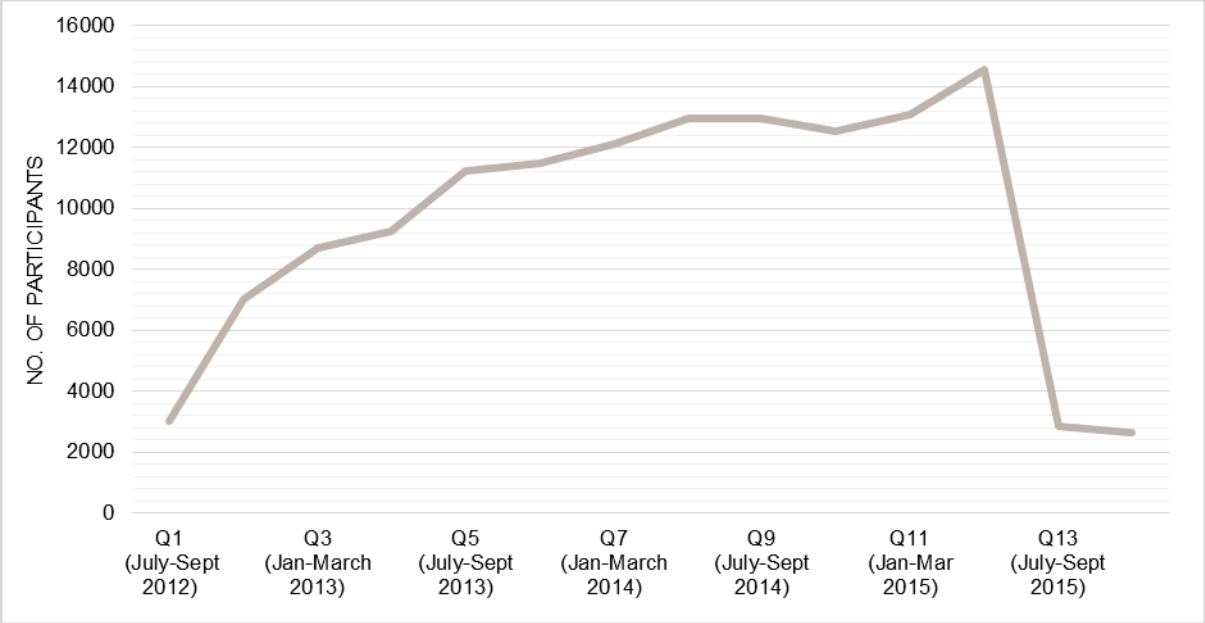
- **Community arm:** Components include case managers, health behavior specialists and community health workers (CHWs). Case managers assess, implement, and coordinate care management services available to patients. Health behavior specialists provide mental health and substance abuse services and case management as needed. Community-based community health workers (CHWs) focus on addressing patients' barriers to care, often meeting patients at appointments and in their homes. Neighborhood navigators (NNs) who canvas neighborhoods in East Baltimore, building awareness of available health care and social service resources. In addition, there are regular neighborhood health fairs and monthly health education classes for the East Baltimore community. At the ambulatory clinics, patients identified for enrollment eligibility were contacted by a Community Health Worker who performed an assessment to identify barriers to care (e.g., transportation, housing, medical appointments). Following the CHW assessment, the case was transferred to a Case Manager who assessed patient medical needs and worked with the patients to identify goals and a care plan. Patients in need of behavioral services were referred to Health Behavior Specialists.

Implementation Updates. J-CHiP received a 12-month no cost extension (NCE) for its community arm. The hospital arm, while no longer receiving HCIA funding, has continued with institutional funding and through HSCRC reimbursement rates. Since NORC's Second Annual Report to CMMI (2016), J-CHiP has made few changes to its model but has added a few supporting components. STAR, a community partner, hosted a caregiver support group meeting for family and friends of patients seeking additional guidance and encouragement. J-CHiP reported that STAR plans to host more of these meetings in 2016 and potentially beyond 2016. J-CHiP also leveraged an already existing initiative established by Johns Hopkins Community Physicians, by distributing "Call Us First" flyers to J-CHiP patients seen in some of the eight affiliated clinics. The flyers provide tips and a call-in number that patients can access 24/7 to determine whether their primary care provider, an urgent care center, or the ED would best address their symptoms.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 31, 2015, J-CHiP had served a cumulative total of 80,257 unique direct participants since program launch. Enrollment in J-CHiP rose steadily through 2013 and remained steady through 2014 and 2015 until the last month of enrollment in June 2015 (see Exhibit JCHiP.1).[71] During the most recent quarter for which data are available (October 1 through December 31, 2015), the program served 2,647 unique participants. About two-thirds of the participants are between 26 and 64 years old (60 percent), and one-fifth are older than 75 years (20 percent). Sixty three percent are female. Most participants are identified as Black or African American (70 percent), and 26 percent as White.

[71] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent J-CHiP self-reported data available for NORC's Third Annual Report is for HCIA reporting Quarter 14, for the time period October-December, 2015.

Exhibit J-CHiP.1: Total Number of J-CHiP Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

Both arms of the J-CHiP intervention demonstrate cost savings and are associated with positive change in CMMI core measures, as follows,

- **Hospital Arm:** both Medicare and Medicaid total quarterly cost of care are reduced, together with a decrease in ED visits per quarter. However, there are small increases in hospitalizations and Medicare readmissions per quarter, and fewer post-discharge practitioner follow-up visits.
- **Community Arm:** total quarterly cost of care decreases for Medicaid but not significantly for Medicare. There are decreases in Medicare and Medicaid hospitalizations and ED visits per quarter, along with decreases in readmissions and avoidable hospitalizations per quarter for Medicaid.

Subgroup analyses allow a more fine-grained exploration of specific aspects within and across each intervention arm:

- **Discharge to Skilled Nursing Facilities (SNF), Hospital Arm.** No change in core measures are noted for enrolled beneficiaries discharged to partner SNFs, assessing using both Medicare and Medicaid claims.
- **Dually Eligible and Medicaid Only Beneficiaries.** For the hospital arm, both dually eligible beneficiaries and those enrolled only in Medicaid experienced lower 90-day total cost of care and fewer 90-day ED visits with respect to a comparison group, with Medicaid only beneficiaries experiencing greater reductions for the outcomes. For the community arm, average quarterly savings in the total cost of care are also attenuated for dually eligible beneficiaries, compared with those enrolled only in Medicaid. In contrast with findings for the hospital arm, there is a larger decrease in ED visits for dually eligible beneficiaries and a statistically significant decrease in potentially avoidable hospitalizations, while the effect size for ED visits is smaller for Medicaid only

beneficiaries and a decrease in potentially avoidable hospitalizations does not reach statistical significance.

- **Program and Dose, Community Arm.** Using Medicare claims, impacts do not vary for beneficiaries according to program participation (engagement with a Neighborhood Navigator, a Johns Hopkins CHW, or a CHW employed by implementation partner STAR) or by dose (whether a beneficiary has contact at least quarterly with program staff or whether contact is less than quarterly). Estimates prepared using Medicaid claims result in similar findings.

In the section below, we present our analyses of program effectiveness, based on three types of data: Medicare Fee-For-Service (FFS) and Medicaid claims; survey data on beneficiary and workforce experience; and narrative from NORC interviews and two site visits. Our claims-based analysis includes four separate analyses: hospital arm using Medicare claims, hospital arm using Medicaid claims, community arm using Medicare claims, and community arm using Medicaid claims.

Core and Supplemental Measures: Hospital Arm, Medicare

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day total cost of care per beneficiary-episode
- 90-day hospitalizations
- 90-day ED visits
- 30-day readmissions
- 7-day practitioner follow-up visits
- 30-day practitioner follow-up visits

Our hospital analysis compares the experiences of J-CHiP Medicare enrollees with those of a weighted comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's innovation over the implementation period and in each quarter of program implementation.[72] Our analysis is for Medicare FFS beneficiaries in the J-CHiP hospital arm, comprising approximately 42 percent percent of all hospital arm enrollees.[73] We also present a subgroup analysis of beneficiaries who were discharged to partner SNFs post-enrollment J-CHiP's hospital arm intervention.

Finder File and Creation of Analytic Sample, Hospital Arm, Medicare. J-CHiP provided a finder file of hospital arm participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[74] We identified 67,103 unique beneficiary-episodes in the finder file. We further limited this number by enrollment date, Medicare identifiers, and whether the episode was an inpatient claim, to yield an analytic sample of 26,144 beneficiary-episodes in the post-intervention period.[75] J-CHiP implemented the hospital arm of its intervention in specific units in Johns Hopkins Hospital (JHH) and hospital-wide in Johns Hopkins Bayview Medical Center (JHBMC). To ensure that the similar episodes were included in the pre-intervention group, J-CHiP provided us another finder file that identified episodes in the pre-intervention

[72] Unless otherwise noted, our quarterly fixed effects (QFE) findings are presented in Appendix D.
[73] Estimated percentage of Medicare FFS beneficiaries comes from awardee self-reported data. See Appendix C for more information on our analysis.
[74] Medicare claims are available through March 31, 2016, for this report. We use a claims run-off date of December 31, 2015, and September 30, 2015, as the cut-off date to account for hospital discharges.
[75] The finder file distinguishes beneficiary-episodes occurring during the intervention's ramp-up period (from program launch on July 1, 2012, through March 31, 2013) from those after full implementation (between April 1, 2013, and June 30, 2015). We include in the post-intervention period episodes discharged from units after the beginning of implementation of the J-CHiP program in those units.

period discharged from specific units where the program was implemented in JHH and JHBMC.[76] We linked this file to Medicare claims to create a pre-intervention group at the two hospitals comprising of 16,316 beneficiary-episodes in the pre-intervention period.[77]

Comparison Group, Hospital Arm, Medicare. We use Medicare claims-based rules to create a comparison group of beneficiary-episodes discharged from similar hospitals in geographic proximity to JHBMC and JHH, during the pre- and post-implementation periods.[78, 79] Comparison hospitals were limited to those in the state of Maryland to account for the Maryland all-payer hospital payment model coinciding with J-CHiP's post-intervention period.[80]

Descriptive Characteristics, Hospital Arm, Medicare. Exhibit J-CHiP.2 displays the descriptive characteristics of Medicare beneficiary-episodes for the treatment and comparison groups before and after implementation of J-CHiP's hospital arm. We compare discharges occurring in the post-intervention period with respect to demographics, comorbidities, and prior utilization.[81] In the post-intervention period, beneficiaries discharged from J-CHiP are more likely to be younger and Black. J-CHiP's beneficiary-episodes are more 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 comparison hospitals in the same period. We use propensity score weighting (relative weighting) to minimize these observed differences in beneficiary-episode characteristics between the J-CHiP Medicare treatment and comparison groups.[82] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability across the groups.[83]

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[76] This finder file identified pre-implementation episodes from specific units in the Johns Hopkins Hospital and Bayview where the J-CHiP program was eventually implemented. We excluded from this file episodes discharged after the J-CHiP program was piloted in units, to obtain an uncontaminated pre-intervention group.

[77] The pre-intervention period was from January 1,2011 to June 30, 2012.

[78] 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 JHBMC is similar to St. Agnes Hospital and Franklin Square Hospitals, in case-mix and patient-demographics.

[79] The J-CHiP program excludes hospitalizations for clinical trials and solid organ/bone marrow transplants from its targeted population. We exclude such beneficiary episodes from the pre-intervention group, as well as the pre- and post-comparison groups. We include only beneficiaries who had a short-term inpatient stay at the treatment/comparison hospitals and who were discharged alive. We exclude beneficiaries admitted to the hospitals and transferred to another inpatient facility from our analysis

[80] Comparison hospitals were limited to those in the state of Maryland because hospitals in this state do not participate in the Inpatient Prospective Payment System (IPPS) program. Since Maryland hospitals directly submit claims to Maryland's Health Services Cost Review Commission, which are then forwarded to CMS, inconsistencies in diagnoses have been reported between preliminary and final claims. Therefore, even comparisons between hospitals within Maryland should be made with caution.

[81] We test differences between the groups with 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).

[82] To improve the selection of comparators, we use propensity score relative weighting. We first estimate the propensity score as predicted probability of a beneficiary-episode belonging to J-CHiP's post-intervention group. We then estimate relative weights for beneficiary-episodes in J-CHiP's pre-intervention group, as well as comparison group during the pre- and post-intervention periods. Beneficiary-episodes in J-CHiP's post-intervention period are assigned a relative weight of 1. We incorporate these relative weights in our regression analysis to minimize observed differences in beneficiary-episode characteristics among the four groups. For more information on relative weighting, please refer to Appendix D.

[83] For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

Exhibit J-CHiP.2: Descriptive Characteristics for J-CHiP Hospital Arm and Comparison Group Medicare Beneficiary-Episodes

	Pre-Intervention		Post-Intervention	
	J-CHiP	Comparison	J-CHiP	Comparison
Number of Beneficiary-Episodes	16,316	47,135	26,144	42,594
Age* % (N)**				
<65 years	32.7 (5,333)	26.5 (12,477)	32.2 (8,415)	25.4 (10,822)
65-69 years	18.5 (3,011)	15.3 (7,212)	17.4 (4,545)	17.0 (7,246)
70-74 years	15.5 (2,534)	14.1 (6,644)	15.6 (4,085)	14.8 (6,292)
75-79 years	12.9 (2,106)	13.5 (6,341)	12.5 (3,280)	13.2 (5,607)
80-84 years	10.7 (1,745)	13.4 (6,306)	10.4 (2,719)	11.9 (5,089)
≥ 85 years	9.7 (1,587)	17.3 (8,155)	11.9 (3,100)	17.7 (7,538)
Race/Ethnicity * % (N)**				
White	64.3 (10,487)	70.5 (33,224)	65.0 (17,006)	68.7 (29,259)
Black	32.7 (5,337)	27.5 (12,946)	31.8 (8,325)	28.7 (12,241)
Other	3.0 (492)	2.0 (965)	3.1 (813)	2.6 (1,094)
Gender * % (N)**				
Female	52.6 (8,585)	54.7 (25,780)	52.5 (13,733)	54.8 (23,323)
Hierarchical Condition Categories (HCCs)				
Mean Count of HCCs (Standard Deviation)***	4.9 (3.4)	5.2 (3.6)	5.6 (3.6)	5.1 (3.5)
Mean HCC Score (SD) ***	3.0 (2.1)	3.2 (2.2)	3.3 (2.1)	3.2 (2.2)
Coverage Reason * % (N)**				
Age	57.2 (9,332)	63.5 (29,929)	56.2 (14,683)	63.3 (26,954)
Disability	39.2 (6,398)	31.4 (14,808)	39.9 (10,436)	32.4 (13,806)
End-Stage Renal Disease (ESRD)	1.2 (203)	1.7 (803)	1.6 (418)	1.7 (710)
Disability and ESRD	2.3 (383)	3.4 (1,595)	2.3 (607)	2.6 (1124)
Discharges * % (N)**				
Home	64.2 (10,480)	59.0 (27,792)	54.9 (14,360)	56.1 (23,888)
SNF	6.3 (1,025)	13.3 (6,288)	12.0 (3,137)	13.4 (5,698)
HHA	12.5 (2,045)	8.0 (3,755)	18.6 (4,868)	8.1 (3458)
Hospice	1.2 (200)	1.8 (845)	1.7 (444)	2.4 (1,012)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes, unless noted)				
Total Medicare Cost (SD) per beneficiary-episode***	$54,793 ($95,888)	$58,269 ($455,705)	$57,933 ($102,300)	$49,512 ($142,444)
Hospitalizations (SD) ***	2,169 (5,619)	2,125 (13,121)	2,139 (4,831)	1,589 (6,613)
ED Visits (SD) ***	1,920 (6,549)	1,606 (5,517)	2,244 (7,238)	1,391 (3,100)
DRG Weight				
Mean DRG Weight (SD)	1.8 (1.5)	1.7 (1.8)	1.7 (1.5)	1.8 (1.7)
DRG Type* % (N)**				
Medical	60.1 (97,98)	73.5 (34,625)	70.7 (18,488)	69.5 (29,616)
Major Diagnostic Category(MDC) * % (N)**				
Circulatory	18.6 (3,028)	20.3 (9,572)	21.5 (5,631)	20.1 (8,549)
Respiratory	9.3 (1,522)	12.6 (5,917)	11.2 (2,916)	11.8 (5,042)
Nervous system	12.4 (2,018)	9.0 (4,228)	10.1 (2,630)	9.8 (4,180)
Musculoskeletal	11.3 (1,840)	8.0 (3,781)	8.3 (2,181)	11.2 (4,765)
Digestive	8.8 (1,433)	9.3 (4,395)	9.9 (2,594)	9.4 (3,998)
Other	39.7 (6,475)	40.8 (19,242)	39.0 (10,192)	37.7 (16,060)

NOTE: *p<0.10, **p<0.05, ***p<0.01. High-cost outliers were not excluded from the analysis.

Impact of J-CHiP, Hospital Arm, Medicare. Exhibit J-CHiP.3 displays the average quarterly and aggregate impact, respectively, of the program for its participants relative to the propensity weighted

comparison group.[84] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[85] We find the following, relative to the comparison group:

- **Cost:** A significant decrease in 90-day total quarterly cost of care (-$1,115 per beneficiary-episode).
- **Utilization Measures:** A small but significant increase in 90-day hospitalizations per quarter (11 per 1,000 beneficiary-episodes) and 30-day readmissions per quarter (14 per 1,000 beneficiary-episodes), and a small non-significant decrease in 90-day ED visits.
- **Quality of Care Measures:** Significant decreases in 7-day and 30-day practitioner follow-up visits per quarter (-41 and -29 per 1,000 beneficiary-episodes, respectively).

To explain the decreases in total cost and accompanying increase in utilization measures, we considered the impact of the J-CHiP hospital arm on inpatient and non-inpatient costs of care. We observe that decreases in total cost of care were driven by significant decreases in non-inpatient costs, with no accompanying increases in inpatient cost.[86] Sensitivity analyses with counts of utilization measures showed that the program did not significantly improve utilization outcomes.[87]

[84] Adjustment factors include age category, race/ethnicity, gender, prior-year hospitalizations and cost, dual eligibility indicator, discharge disposition, HCC score, ESRD indicator, disability indicator and measures from the Medicare Severity-Diagnosis Related Group (MS-DRG) weight, MS-DRG type (medical or surgical, and major diagnostic category (MDC). Readmissions and cost models exclude prior-year hospitalization or cost; hospitalization and ED visit models exclude prior-year hospitalization.
[85] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.
[86] Non-inpatient costs significantly decreased ($p<0.05$) by -$472 per beneficiary-episode per quarter.
[87] These sensitivity analyses are not shown in this report.

Exhibit J-CHiP.3: Impact of J-CHiP Program Hospital Arm on Outcomes, Medicare Beneficiary-Episodes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiary-episodes unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**
90-day Total Cost of Care per beneficiary-episode ($)	**-$1,115 [-$2,236, $0]***
90-day Hospitalizations	**11 [0, 22]***
90-day ED Visits	-10 [-21, 1]
30-day Readmissions	**14 [4, 24]****
7-day Practitioner Follow-up Visits	**-41 [-51, -31]*****
30-day Practitioner Follow-up Visits	**-29 [-40, -18]*****
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$29,153,336 [-$58,468,168, $0]***
Hospitalizations	**293 [5, 581]***
ED Visits	-268 [-561, 25]
Readmissions	**372 [109, 635]****
7-day Practitioner Follow-up Visits	**-1,074 [-1,337, -811]*****
30-day Practitioner Follow-up Visits	**-758 [-1,042, -474]*****

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. §: Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§: Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of beneficiary-episodes (26,144) and the length of program implementation included in analysis (8 quarters).

Quarterly Fixed Effects (QFE) Difference-in-Differences (DID) Analysis. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Subgroup Impact for J-CHiP, Hospital Arm with Partner SNFs, Medicare. The J-CHiP hospital program partnered with a group of SNFs to improve the continuum of post-acute care for its participants. We conducted a subgroup analysis of beneficiary-episodes discharged to these partner SNFs, detailed in Appendix D.[88] We did not observe significant decreases in cost of care or utilization measures, or significant improvements in post-discharge practitioner follow-up for the SNF subgroup.

Core and Supplemental Measures: Hospital Arm, Medicaid

Our post-acute care (hospital) analysis compares the experiences of J-CHiP enrollees with those of a weighted comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's innovation over the implementation period as a whole and in each quarter of program implementation.[89] Our analysis is for Medicaid beneficiaries in the J-CHiP hospital arm, comprising 33

[88] In the SNF subgroup analysis, the internal comparison group comprised beneficiary-episodes discharged from JHH/JHBMC to partner SNFs in the pre-intervention period, and the external comparison group comprised beneficiary episodes discharged from comparison hospitals to SNFs, in the pre- and post-intervention periods. Discharges to partner SNFs from comparison hospitals were excluded.

[89] Unless otherwise noted, our QFE findings are presented in Appendix D.

percent of all hospital arm enrollees.[90] In addition, we present subgroup analyses for 1) beneficiaries who were discharged to partner SNF's post-enrollment in the innovation, and 2) a comparison of the experiences of dually eligible beneficiaries with those who receive Medicaid only.

Finder File and Creation of Analytic Sample, Hospital Arm, Medicaid. J-CHiP provided a finder file of hospital arm participants and their enrollment dates, enabling us to use Medicaid claims from Maryland to calculate outcome measures.[91] We identified 28,822 unique beneficiary-episodes and further restricted by enrollment date, Medicaid identifiers, and whether the episode was an inpatient claim, to yield an analytic sample of 13,745 episodes. [92] J-CHiP also provided us another finder file that identified episodes in the pre-intervention period discharged from specific units where the program was implemented in JHH and JHBMC.[93] We linked this file to Maryland Medicaid claims to create a pre-intervention group at the two hospitals comprising of 11,226 beneficiary-episodes in the pre-intervention period.

Comparison Group, Hospital Arm, Medicaid. As with the Medicare analysis presented in the previous section, our study design uses claims-based rules to identify beneficiary-episodes discharged from comparison hospitals from Maryland. [94] Implementation of Maryland's all-payer hospital payment model during J-CHiP's post-intervention period meant that comparators from Maryland hospital would most likely be an appropriate match; in addition, our claims source required us to limit the comparison group to Maryland hospitals.

Descriptive Characteristics, Hospital Arm, Medicaid. Exhibit J-CHiP.4 displays the descriptive characteristics of J-CHiP Medicaid beneficiary-episodes before and after implementation of the hospital arm intervention. We compare discharges occurring in the post-intervention period for the J-CHiP and comparison groups with respect to demographics, comorbidity burden, and prior utilization.[95] In the post-intervention period, beneficiaries discharged from J-CHiP are more likely to be 40 to 60 years in age and Black. J-CHiP's beneficiary-episodes are likely to have higher adjusted clinical risk groups scores (ACG)

[90] Estimated percentage of Medicaid beneficiaries comes from awardee self-reported data. See Appendix C for more information on our analysis.

[91] We obtained Maryland Medicaid claims from the Maryland Department of Health and Mental Hygine, provided to us through the Hilltop Institute

[92] The finder file distinguishes beneficiary-episodes occurring during the intervention's ramp-up period (from program launch on July 1, 2012, through March 31, 2013) from those after full implementation (between April 1, 2013, and June 30, 2015). We include in the post-intervention period episodes discharged from units after the beginning of implementation of the J-CHiP program in those units.

[93] This finder file identified pre-implementation episodes from specific units in the Johns Hopkins Hospital and Bayview where the J-CHiP program was eventually implemented. We excluded from this file episodes discharged after the J-CHiP program was piloted in units, to obtain an uncontaminated pre-intervention group. The pre-intervention period was from January 1, 2011 to June 30, 2012.

[94] 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 JHBMC is similar to St. Agnes Hospital and Franklin Square Hospitals, in case-mix and patient-demographics. The J-CHiP program excludes hospitalizations for clinical trials and solid organ/bone marrow transplants from its targeted population. We exclude such beneficiary episodes from the pre-intervention group, as well as the pre- and post-comparison groups. We include only beneficiaries who had a short-term inpatient stay at the treatment/comparison hospitals and who were discharged alive. We exclude beneficiaries admitted to the hospitals and transferred to another inpatient facility from our analysis.

[95] We test differences between the groups with 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 dual eligibility).

relative to beneficiary-episodes discharged from the comparison hospitals.[96] They also tend to have higher prior utilization and cost, but are less likely to be disabled. They are less likely to be discharged to home health than are beneficiary-episodes discharged from comparison hospitals in the same period. As with the Medicare analysis, we use propensity score relative weighting to adjust for these observed differences in covariates across treatment and comparison groups.[97] We ran separate propensity score models for dually eligible and Medicaid only beneficiary-episodes and eventually combined them in pooled analyses.[98] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability between the groups.

Exhibit J-CHiP.4: Descriptive Characteristics for J-CHiP Hospital Arm and Comparison Group Medicaid Beneficiary-Episodes

	Pre-Intervention		Post-Intervention	
	J-CHiP	Comparison	J-CHiP	Comparison
Number of Beneficiary-Episodes	11,226	5,888	13,745	4,625
Age * % (N)**				
20-39 years	36.1 (4,047)	31.6 (1,861)	22.3 (3,061)	41.1 (1,900)
40-60 years	42.8 (4,804)	37.6 (2,216)	48.2 (6,625)	37.3 (1,724)
61-75 years	15.1 (1,692)	20.3 (1,195)	21.4 (2,943)	15.0 (693)
76+ years	6.1 (683)	10.5 (616)	8.1 (1,111)	6.6 (307)
Race/Ethnicity * % (N)**				
White	32.6 (3,659)	46.7 (2,747)	36.4 (5,001)	44.5 (2,060)
Black	48.5 (5,450)	35.1 (2,068)	52.8 (7,258)	31.1 (1,437)
Other	18.9 (2,117)	18.2 (1,073)	10.8 (1486)	24.4 (1,128)
Gender * % (N)**				
Female	55.0 (6,172)	63.2 (3,722)	53.2 (7312)	62.2 (2,875)
Adjusted Clinical Groups (ACG) Risk Score				
Mean Score (SD) ***	4,313 (1,286)	4,269 (1,309)	4,862 (697)	4,033 (1,417)
Reason for Coverage * % (N)**				
Age	6.5 (734)	8.5 (498)	2.7 (373)	6.3 (292)
Disability	57.4 (6,440)	43.7 (2,575)	8.2 (1,130)	30.6 (1,416)
Other	36.1 (4,052)	47.8 (2,815)	89.1 (12,242)	63.1 (2,917)
Discharge Status * % (N)**				
Home	74.6 (8,376)	75.0 (4,418)	62.0 (8,521)	80.3 (3,716)
SNF	2.2 (252)	7.7 (456)	6.4 (883)	5.6 (261)
Dual Eligibility * % (N)**				
Not Dually Eligible	58.9 (6,608)	49.2 (2,895)	54.3 (7,464)	66.9 (3,092)

[96] The ACG measures the morbidity burden of patients based on age, gender, and disease patterns, as indicated from diagnostic and/or pharmaceutical code on claims.

[97] To improve the selection of comparators, we use propensity score relative weighting. We first estimate the propensity score as predicted probability of a beneficiary-episode belonging to J-CHiP's post-intervention group. We then estimate relative weights for beneficiary-episodes in J-CHiP's pre-intervention group, as well as comparison group during the pre- and post-intervention periods. Beneficiary-episodes in J-CHiP's post-intervention period are given a relative weight of 1. We incorporate these relative weights in our regression analysis to minimize observed differences in beneficiary-episode characteristics among the four groups. For more information on relative weighting, please refer to Appendix D.

[98] See Appendix D for more information about our approach to propensity score modeling, including the covariates used. While we do not include Medicaid managed care enrollment in our propensity score model, we adjust for differences in managed care enrollment in our DID models.

	Pre-Intervention		Post-Intervention	
	J-CHiP	Comparison	J-CHiP	Comparison
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes, unless noted)				
Total Medicaid Cost (SD) per beneficiary-episode***	$28,533 ($61,912)	$22,228 ($50,778)	$36,388 ($79,332)	$15,270 ($39,637)
Hospitalizations (SD) ***	1,050 (2,582)	832 (2,179)	1,571 (3,019)	736 (2,017)
ED Visits (SD) ***	1,634 (5,471)	1,395 (4,035)	2,773 (7,928)	1,519 (3,952)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of J-CHiP, Hospital Arm, Medicaid. Exhibit J-CHiP.5 presents the average quarterly and aggregate impact of the J-CHiP hospital program on its Medicaid participants relative to the comparison group.[99] Estimates are presented for the impact of the program on all Medicaid participants (pooled), as well as separately for dually eligible and Medicaid only participants. For duals, we present impacts on total cost of care and ED visits, since Medicare is the primary payer for hospital and physician services for these beneficiaries. As with the Medicare models above, the table presents adjusted models of the average quarterly and aggregate impact of the program on its participants relative to the comparison group. [100] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[101]

For *all Medicaid beneficiaries (pooled analysis)*, we find the following, relative to the comparison group:

- **Cost:** A significant decrease in 90-day total cost of care (-$4,987 per beneficiary-episode).
- **Utilization Measures:** A significant decrease in 90-day ED visits per quarter (-134 per 1,000 beneficiary-episodes per quarter), smaller but significant increase in beneficiary-episodes with 90-day hospitalizations per quarter (53 per 1,000 beneficiary-episodes), and a smaller non-significant increase in 30-day readmissions.
- **Quality of Care Measures:** Significant decreases in both 7-day and 30-day practitioner follow-up visits per quarter (-70 and -184 per 1,000 beneficiary-episodes, respectively).

For dually eligible beneficiaries, we find the following, relative to the comparison group:

- **Cost:** A significant decrease in 90-day total cost of care (-$2,730 per beneficiary-episode).
- **Utilization:** a significant decrease in 90-day ED visits per quarter (-86 per 1,000 beneficiary-episodes).

For *beneficiaries enrolled only in Medicaid*, we find the following, relative to the comparison group**:**

- **Cost:** a significant decrease in 90-day total cost of care (-$7,954 per beneficiary-episode).
- **Utilization Measures:** a significant decrease in 90-day ED visits per quarter (-153 per 1,000 beneficiary-episodes), a smaller non-significant decrease in 90-day hospitalizations and a non-significant increase in 30-day readmissions.

[99] Adjustment factors include age category, race/ethnicity, gender, prior-year utilization, prior-year coverage under Medicaid, discharge disposition, ACG score, reason for coverage, and dual eligibility.

[100] Adjustment factors include age category, race/ethnicity, gender, prior-year utilization, prior-year coverage under Medicaid, discharge disposition, ACG score, and reason for coverage. Pooled analysis also adjusts for dual eligibility.

[101] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

- **Quality of Care:** a significant decrease in 30-day practitioner follow-up visits per quarter (-111 per 1,000 beneficiary-episodes)

Exhibit J-CHiP.5: Impact of J-CHiP Program Hospital Arm on Outcomes, Medicaid Beneficiary-Episodes

AVERAGE QUARTERLY IMPACT§			
Outcome Measure (per 1,000 Beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**		
	Pooled Medicaid (N=13,745)	**Dually Eligible (N= 6,281)**	**Medicaid Only (N= 7,464)**
90-day Total Cost of Care per Beneficiary-episode ($)	**-$4,987 [-$6,909, -$3,065]*** **	**-$2,730 [-$5,078, -$382]***	**-$7,954 [-$11,479, -$4,429]*** **
90-day Hospitalizations	**53 [18, 88]****		-11 [-63, 41]
90-day ED Visits	**-134 [-161, -107]*** **	**-86 [-123, -49]*** **	**-153 [-196, -110]*** **
30-day Readmissions	6 [-25, 36]		7[-24, 39]
7-day Practitioner Follow-up Visits	**-70 [-92, -48]*** **		-27 [-62, 8]
30-day Practitioner Follow-up Visits	**-184 [-212, -156]*** **		**-111 [-154, -69]*** **
AGGREGATE IMPACT§§			
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**		
Total Cost of Care ($)	**-$68,541,307 [-$94,956,908, -$42,125,706]*** **	**-$17,145,617 [-$31,895,295, -$2,395,939]***	**-$59,365,802 [-$85,678,745, -$33,052,859]*** **
Hospitalizations	**733 [255, 1211]***		-83 [-472, 306]
ED Visits	**-1,844 [-2,214, -1,474]*** **	**-543 [-777, -309]*** **	**-1180 [-1494, -866]*** **
Readmissions	76 [-344, 496]		102 [-324, 529]
7-day Practitioner Follow-up Visits	**-967 [-1,272, -662]*** **		-205 [-469, 59]
30-day Practitioner Follow-up Visits	**-2,531 [-2,920, -2,142]*** **		**-829 [-1147, -511]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. §: Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§: Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of beneficiary episodes (13,745) and total length of program implementation in analysis (8 quarters).

QFE DID Analysis. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Subgroup Impact for J-CHiP, Hospital Arm with Partner SNFs, Medicaid. To study J-CHiP's impact on beneficiary-episodes discharged to partner SNFs, we conduct a subgroup analysis detailed in Appendix D.[102] We did not observe significant decreases in cost of care or utilization measures or significant improvements in post-discharge practitioner follow-up for the SNF subgroup.

[102] In the SNF subgroup analysis, the internal comparison group comprised beneficiary-episodes discharged from JHH/JHBMC to partner SNFs in the pre-intervention period, and the external comparison group comprised beneficiary-episodes discharged from comparison hospitals to SNFs, in the pre- and post-intervention periods. We excluded discharges to partner SNFs from comparison hospitals.

Core and Supplemental Measures: Community Arm, Medicare

Our community (ambulatory care) analysis compares the experiences of J-CHiP enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's innovation over the enrollment period and during each quarter of enrollment.[103] Our analysis is for Medicare FFS beneficiaries in the J-CHiP community arm, who comprise approximately 52 percent percent of all community arm participants.[104] We also present two subgroup analyses of enrollees by program and dose relative to matched comparison groups. For the program subgroup analysis, we compare program impacts for enrollees receiving assistance from three types of program staff: 1)Neighborhood Navigators who canvas East Baltimore neighborhoods engaging beneficiaries in managing their health and directing them to primary care; 2) community-health workers employed by Johns Hopkins and who work in primary care clinics helping enrollees manage their health and 3) community-health workers employed through a partner organization, Sisters Together and Reaching (STAR), who engage enrollees in a variety of settings (clinics and homes) to help enrollees manage their health. For the dose analysis, we compare program impacts for participants who had and did not have continuous contact with program staff in each quarter, relative to a matched comparison group.

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- 30-day Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Finder File and Creation of Analytic Sample, Community Arm, Medicare. J-CHiP provided finder files with community arm participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures. We identified 2,327 unique beneficiaries, and further limited this number by Medicare Part A/B coverage and enrollment date to yield an analytic sample of 2,126 beneficiaries for the J-CHiP community arm.[105]

Comparison Group, Community Arm, Medicare. For the community program analysis, we use claims-based rules to select comparison Medicare FFS beneficiaries who live in geographic proximity, defined by zip-codes, to J-CHiP participants for the duration of the year prior to the intervention, and for the year following the intervention start date. From this pool of potential beneficiaries, we identify those who had at least one evaluation and management visit to a practitioner and use that date to determine start of enrollment. We use propensity score matching to find appropriate comparators from the comparison pool. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[106]

Descriptive Characteristics, Community Arm, Medicare. Exhibit J-CHiP.6 displays the descriptive characteristics of J-CHiP Medicare beneficiaries in J-CHiP's community arm and their matched

[103] Unless otherwise noted, our QFE findings are presented in Appendix D.
[104] Estimated percentage of Medicare FFS participation comes from the awardee's Q14 self-reported data. See Appendix C for more information about our analysis.
[105] Medicare claims are available through March 31, 2016, for the analysis in this report. We use December 31, 2015, as the cut-off date to account for the 90-day claims runoff.
[106] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

comparison sample, with respect to demographics, number of other chronic conditions, prior utilization, and program enrollment. The population is largely female (62 percent) and Black (56 percent), and approximately two out of five beneficiaries are dually eligible. After matching, we find few statistically significant differences between the groups. J-CHiP participants have slightly fewer chronic conditions and a lower rate of ED visits, but a higher total cost of care in the prior year.

Exhibit J-CHiP.6: Descriptive Characteristics for J-CHiP Community Arm and Comparison Group Medicare Beneficiaries

Variable	Value	
	J-CHiP	Comparison
Number of Beneficiaries	2,126	2,126
Mean Number of Quarters Enrolled [Range]	11.7 [5-13]	5.4 [1-11]
Gender % (N)		
Female	61.7 (1312)	61.3 (1304)
Age Group % (N)		
<65 years	34.0 (722)	32.8 (698)
65-69 years	10.8 (230)	13.0 (276)
70-74 years	12.2 (260)	12.8 (273)
75-79 years	12.1 (258)	13.3 (283)
80-84 years	12.9 (274)	12.7 (270)
≥85 years	18.0 (382)	15.3 (326)
Race/Ethnicity % (N)		
White	42.4 (901)	42.1 (894)
Black	55.6 (1182)	56.2 (1194)
Other	2.0 (43)	1.8 (38)
Dual Eligibility % (N)		
Dually Enrolled	48.5 (1032)	47.5 (1009)
Coverage Reason % (N)		
Age	51.4 (1093)	52.6 (1118)
Disability	44.8 (953)	43.7 (930)
ESRD	1.1 (23)	1.4 (29)
Both ESRD and Disability	2.7 (57)	2.3 (49)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)	2.4 (1.8)	2.5 (1.7)
Mean Count of HCCs (SD) *	3.8 (3.1)	4.2 (3.0)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost (SD) per beneficiary*	$49,864 ($752,468)	$34,246 ($54,425)
Hospitalizations (SD)	1,587.9 (13,612.9)	1184.6 (2,097.5)
ED Visits **	1,689.0 (5949.0)	1,858.4 (6,013.5)
30-Day Readmissions (SD)	300.4 (2860.0)	345.6 (1,259.7)
ACS Hospitalizations (SD)	304.3 (2,999.7)	325.8 (998.2)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of J-CHiP, Community Arm, Medicare. Exhibit J-CHiP.7 displays the average quarterly and aggregate impact of the J-CHiP community program for its participants relative to the comparison

group.[107] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[108] We find the following for Medicare beneficiaries in J-CHiP's community arm, relative to the comparison group:

- **Cost:** A non-significant decrease in total quarterly cost of care.
- **Utilization Measures:** A significant decrease in hospitalizations per quarter (-17 per 1,000 beneficiaries) and ED visits per quarter (-16 per 1,000 beneficiaries) and a non-significant decrease in 30-day readmissions.
- **Quality of Care:** A non-significant increase in ACS hospitalizations.

Exhibit J-CHiP.7: Impact of J-CHiP Program Community Arm on Outcomes for Medicare Beneficiaries

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (Number per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	-$495 [-$1,109, $119]
Hospitalizations	**-17 [-27, -7]*** **
ED Visits	**-16 [-26, -6]** **
Readmissions	-2 [-31, 27]
ACS Hospitalizations	3 [-4, 10]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	-$4,872,064 [-$10,915,633; $1,171,505]
Hospitalizations	**-163 [-262, -64]*** **
ED Visits	**-158 [-261, -55]** **
Readmissions	-3 [-55,49]
ACS Hospitalizations	27 [-38,92]

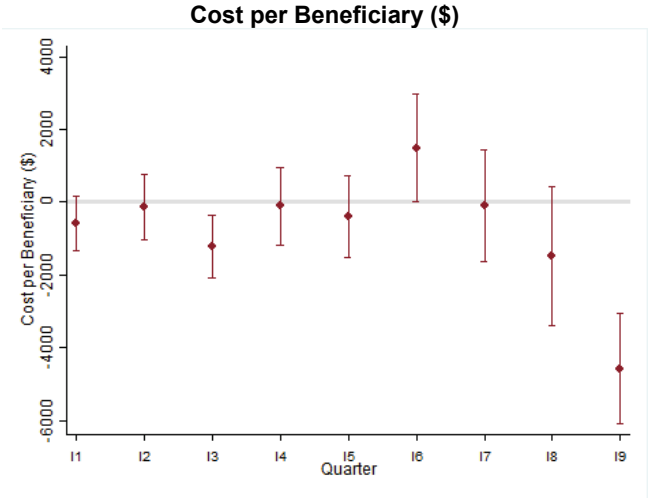
NOTE: *p<0.10, **p<0.05, ***p<0.01. §: Quarterly Impact is the average quarterly DID estimate per quarter of program implementation.§§: Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (2,126) and length of program implementation in analysis (9 quarters).

QFE DID Analysis, Community Arm, Medicare. Exhibit J-CHiP.8 displays the results of a QFE DID model for total cost of care that assesses the impact of J-CHiP in each post-intervention quarter. Findings from QFE models for utilization outcomes are consistent with the average quarterly impact summarized above; please see Appendix D for presentation of these results. However, for total cost of care per beneficiary, the results of QFE DID models show a decline in cost in post-intervention Q7 through Q9, with a statistically significant difference in Q9, relative to the comparison group.

[107] Adjustment factors are post-intervention indicator, age category, gender, race/ethnicity, dual eligibility indicator, HCC Risk score, discharge category, a disability indicator, and an ESRD indicator.

[108] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit J-CHiP.8: Impact of J-CHiP Program Community Arm on Total Cost of Care for Medicare Beneficiaries, by Quarter



Subgroup Analysis: Impact for J-CHiP Community Arm, Medicare, by Program and Dose. We compare whether impacts for J-CHiP's community program vary between beneficiaries receiving assistance from Neighborhood Navigators, by a Johns Hopkins CHW or STAR CHW, relative to a matched comparison group, and by dose (e.g., whether an enrollee is in continuous or intermittent contact with intervention staff). These subgroup analyses are detailed in Appendix D.

- **Program:** Outcomes for beneficiaries managed by JH CHWs or STAR CHWs are similar to each other and to the impacts observed in the main analysis. Impacts for the Neighborhood Navigator program do not reach statistical significance due to the small sample size.
- **Dose:** Impacts in cost of care and utilization are similar for those with continuous contact (any contact by phone, email, or in-person with program staff each quarter) and those who do not have contact each quarter.

Core and Supplemental Measures: Community Arm, Medicaid

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- 30-day Readmissions
- Potentially Avoidable Hospitalizations (PAH)

Our community analysis compares the experiences of Medicaid beneficiaries with those of a matched group of comparators over the entire enrollment period and for each quarter of enrollment. The analyses consider the impact on utilization, cost, and quality of care of the awardee's innovation. Parallel to the Medicare analysis, we also present two subgroup analyses: one comparing the experiences of dually eligible and non-dually eligible beneficiaries, and a second comparing experiences by program and dose. In the analysis by program, however, we are unable to examine Medicaid beneficiaries served by the Neighborhood Navigator program due to the small sample size.

Finder File and Creation of Analytic Sample, Community Arm, Medicaid: J-CHiP provided NORC with finder files of participants and their enrollment dates, enabling us to pull Medicaid claims for these

beneficiaries and calculate outcomes.[109] We identified 4,504 Medicaid beneficiaries, and further limited this number by Medicaid identifiers and enrollment date to yield an analytic sample of 2,511 beneficiaries.

Comparison Group, Community Arm, Medicaid. For the community program analysis, we use claims-based rules to select comparison Medicaid beneficiaries, as described in the previous section on the analysis of Medicare claims for the community arm. The comparison pool consists of non-institutionalized Medicaid beneficiaries who live in geographic proximity to J-CHiP program participants for the duration of the year prior to the intervention, and for the year following the intervention start date. From this pool of potential beneficiaries, we select those who had at least one evaluation and management visit to a practitioner. To further improve the selection of comparison populations, we use propensity score matching.[110]

Descriptive Characteristics, Community Arm, Medicaid. Exhibit J-CHiP.9 displays the descriptive characteristics of Medicaid beneficiaries in J-CHiP's community arm and a matched comparison sample, with respect to demographics, prior utilization, and program enrollment. The population is largely female (68 percent) and majority Black (64 percent), and approximately two out of five beneficiaries are dually eligible. After matching, we find few statistically significant differences between the groups. J-CHiP participants have slightly more chronic conditions and more hospitalizations but a lower rate of ED visits and a slightly higher total cost of care in the prior year.

Exhibit J-CHiP.9: Descriptive Characteristics for J-CHiP Community Arm and Comparison Group Medicaid Beneficiaries

Variable	J-CHiP	Comparison
Number of Beneficiaries	2,511	2,184
Gender % (N)		
Female	67.7 (1700)	67.9 (1483)
Age Group % (N) ***		
20-39 years	14.8 (371)	16.1 (352)
40-60 years	51.9 (1304)	55.6 (1214)
61-75 years	21.4 (538)	19.5 (425)
Race/Ethnicity % (N)		
White	30.3 (761)	29.1 (636)
Black	64.4 (1618)	65.3 (1426)
Other	44.5 (1117)	40.3 (880)
Coverage Reason % (N)**		
Age	7.2 (181)	7.6 (166)
Disability	48.3 (1213)	52.1 (1138)
Other	44.5 (1117)	40.3 (880)
Coverage in the Prior Year Days		
Number of Days (Standard Deviation)	316 (100)	311 (104)
Dual Eligibility % (N)		
Dually Enrolled	41.5 (1042)	38.7 (845)

[109] We define enrollment for the community arm participants based on the date the care manager opened a care plan for the participant. Maryland Medicaid files were available through March 31, 2015, for analysis presented in this report.

[110] For more detailed information on propensity score models and matching, please refer to Appendix D.

Variable	J-CHiP	Comparison
Managed Care % (N)* **		
Enrolled in managed care	54.2 (1361)	58.7 (1283)
Adjusted Clinical Group (ACG) Risk Score * **		
Mean Score (SD)	4844.9 (637.1)	4895.0 (601.2)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost (SD) per beneficiary	$25,865 ($49,482)	$26,604 ($50,573)
Hospitalizations (SD)	899.2 (1939.7)	889.2 (1897.4)
ED Visits	2067.7 (4851.8)	2366.3 (6741.1)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of J-CHiP, Community Arm, Medicaid. Exhibit J-CHiP.10 presents the average quarterly and aggregate impact of J-CHiP's community program on its Medicaid participants relative to the comparison group.[111] Estimates are presented for the impact of the program on all Medicaid participants (pooled), as well as separately for dually eligible beneficiaries and those enrolled only in Medicaid. For duals we present only impacts on total cost of care and ED visits, since Medicare is the primary payer for hospital and physician services for these beneficiaries. We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[112]

For *all Medicaid beneficiaries (pooled analysis)*, we find the following, relative to the comparison group:

- **Cost:** a significant decrease in total quarterly cost of care (-$1,756 per beneficiary)
- **Utilization Measures:** significant decreases in beneficiaries with hospitalizations per quarter (-31 per 1,000 beneficiaries); ED visits per quarter (-48 per 1,000 beneficiaries) and readmissions per quarter (-36 per 1,000 beneficiaries)
- **Quality of Care:** a significant decrease in beneficiaries with potentially avoidable hospitalizations per quarter (-7 per 1,000 beneficiaries).

For *dually eligible Medicaid beneficiaries*, we find the following, relative to the comparison group:

- **Cost:** a significant decrease in total quarterly cost of care (-$1,041 per beneficiary).
- **Utilization:** a significant decrease in ED visits per quarter (-56 per 1,000 beneficiaries).

For *beneficiaries enrolled only in Medicaid*, we find the following, relative to the comparison group:

- **Cost:** a significant decrease in total quarterly cost of care (-$1,621 per beneficiary).
- **Utilization Measures:** a significant decrease in hospitalizations per quarter (-29 per 1,000 beneficiaries) and ED visits per quarter (-44 per 1,000 beneficiaries) but no significant decrease in readmissions.
- **Quality of Care:** a non-significant decrease in potentially avoidable hospitalizations.

[111] Adjustment factors include post-intervention indicator, age category, gender, race/ethnicity, indicators for reason for Medicaid coverage, indicator for managed care participation, and ACG risk score. Pooled models also include a dual eligibility indicator.

[112] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit J-CHiP.10: Impact of J-CHiP Program Community Arm on Outcomes for Medicaid Beneficiaries

AVERAGE QUARTERLY IMPACT§			
Outcome Measure (Number per 1,000 Beneficiaries unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**		
	Pooled Medicaid (N=2,511)	**Dually Eligible (N=1,042)**	**Medicaid Only (N=1,469)**
Total Cost of Care per Beneficiary ($)	**-$1,756 [-$2,584, -$928]*** **	**-$1,041 [-$1,497, -$585]*** **	**-$1,621 [-$3,048, -$194]***
Hospitalizations	**-31 [-39, -23]*** **		**-29 [-38, -20]*** **
ED Visits	**-48 [-59, -37]*** **	**-56 [-71, -41]*** **	**-44 [-58, -30]*** **
Readmissions	**-36 [-64, -8]****		14 [-72,100]
PAHs	**-7 [-11, -3]*** **		-4 [-10,2]
AGGREGATE IMPACT§§			
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**		
Total Cost of Care ($)	**-$24,715,159 [-$36,364,567; -$13,065,751]*** **	**-$5,210,089 [-$7,494,335; -$2,925,843]*** **	**-$14,709,659 [-$27,658,402; -$1,760,916]***
Hospitalizations	**-434 [-547, -321]*** **		**-266 [-350, -182]*** **
ED Visits	**-671 [-820, -522]*** **	**-278 [-355, -201]*** **	**-398 [-527, -269]*** **
Readmissions	**-55 [-97, -13]****		14 [-71, 99]
PAHs	**-98 [-156, -40]*** **		-41 [-96, 14]

NOTE: *p<0.10, **p<0.05, ***p<0.01. §: Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§: Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (2,511) and length of program implementation in analysis (8 quarters).

QFE DID Analysis. Findings from QFE models for cost, utilization, and quality outcomes for J-CHiP Medicaid beneficiaries (overall) are consistent with the average quarterly impact summarized above; please see Appendix D for presentation of these results.

Subgroup Impact for J-CHiP Community Arm, Medicaid, by Program and Dose. We compare whether impacts for J-CHiP's community program vary between beneficiaries managed by a Johns Hopkins CHW or a STAR CHW, relative to a matched comparison group, and by dose (e.g., whether an enrollee is in continuous or intermittent contact with intervention staff). These subgroup analyses are detailed in Appendix D.[113]

- **Program:** Outcomes for beneficiaries managed by JH CHWs or STAR CHWs are similar to each other and to those observed in the main analysis.
- **Dose:** Outcomes for total cost of care and utilization are similar for those with and without continuous contact.

[113] Note that we were unable to match enough individuals who received the Neighborhood Navigator program with Medicaid claims data to conduct an analysis on this program component using Medicaid claims.Additionally, results from the Neighborhood Navigator analyses should be interpreted with caution, given the small sample sizes.

Quality of Care: Survey and Qualitative Findings

NORC's evaluation uses survey data to assess the impact of the J-CHiP intervention on quality of care, measured in terms of provider-participant communication, participant education, engagement, care planning, and participant satisfaction. In April 2014, J-CHiP incorporated three NORC-developed items —related to taking prescription medications, discharge plans, and patient education—into its existing, modified Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey for J-CHiP participants currently in the community arm but who may also have been in the hospital arm. In May 2015, NORC received modified CAHPS survey data from J-CHiP, including data for NORC's new questions, for surveys administered from November 2014 through March 2015. The modified CAHPS survey includes questions regarding participant satisfaction with both J-CHiP clinicians and J-CHiP CHWs. See Appendix F for a full presentation of survey findings.

Provider-Participant Communication. Overwhelmingly, survey respondents report that their doctors explained things clearly (99 percent), listened carefully (95 percent), showed respect (99 percent), provided easy-to-understand instructions (98 percent), knew their medical history (95 percent), and spent enough time with them (98 percent). Likewise, survey respondents report that their CHWs explained things in a way that was easy to understand (95 percent), listened carefully (91 percent), and showed respect for what they had to say (94 percent).

Patient Education, Engagement, and Care Planning. Most J-CHiP respondents report that during their most recent visit, someone in the provider's office helped them understand how to take care of themselves (82 percent) and the next steps in their medical care (78 percent). A slightly lower percentage of respondents report talking to someone in the provider's office about the purpose of taking their prescription medicine (71 percent). Approximately three-quarters of respondents note that in the previous 12 months they had a discussion with someone in the provider's office about specific goals for their health (78 percent). However, a comparatively lower percentage of respondents report having discussions about the challenges of taking care of their own health (66 percent).

J-CHiP's community intervention also focused on helping those with mental and substance abuse needs. We find that roughly three-quarters of J-CHiP community respondents report being asked if they experienced a period of sadness, emptiness, or depression in the last 12 months (72 percent). A smaller portion of respondents report having a discussion about personal or family problems, substance abuse, or mental or emotional illness (65 percent).

Participant Satisfaction. Overall, J-CHiP community respondents are extremely satisfied with their providers. On a scale of 0 to 10, with 0 being the worst and 10 being the best, J-CHiP patients rate their doctors an average of 8.9. When asked to rate their trust in their doctors on scale of 0 to 10, with 0 being do not trust this provider at all and 10 being trust this provider completely, J-CHiP community patients rated their doctors an average of 9.0. Furthermore, 95 percent of respondents say they would recommend the provider's office to their family and friends.

Interestingly, we find a statistically significant difference by respondent's race in the rating of providers from best to worst; Whites ($M = 9.15$, $SD = 1.42$) are significantly ($t(266) = 2.19$, $p < .05$) more likely to

rate their providers higher than are Blacks (M=8.69, SD=1.89). However, we find no significant race differences in participant ratings of trust in the provider or recommendations to family and friends.

Survey respondents are very satisfied with their CHWs. Ninety-two percent of respondents say they would recommend the CHW to their family and friends. Additionally, on a scale of 0 to 10, from least to most trust in the CHW, J-CHiP patients rate their CHWs an average of 9.1. We find no significant differences in patient ratings of CHWs by race.

Workforce Development

Staffing. The J-CHiP initiative includes a diverse workforce of clinical and non-clinical roles, from physicians and pharmacists to CHWs and NNs. The project includes expanded roles for both current and newly recruited staff; the latter work largely within the clinic and community-based interventions. J-CHiP noted that a barrier to recruiting an information technology (IT) workforce was attributable to a small pool of applicants with the technical skills and experience to develop electronic communications tools and analysis. It also reported that the pay rates initially specified for community case managers were not competitive, and some staff left for better-paying and more secure positions. Subsequently, J-CHiP developed a referral and retention program that awarded current staff a pay increase for referring qualified individuals to open positions. In addition, clinical staff who remain after the HCIA award ends will receive a bonus.

> "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. We learn something new every week and every day. My previous training was intense, but this is more vast, covering more areas than just a few concentrated areas…and has been very informative."
>
> –Community Health Worker

Training. Anyone hired through the HCIA award undergoes J-CHiP training. This includes an overview of the target population for J-CHIP, locating how and where the new employee fits into the overall program, and a review of J-CHiP's driver diagram or conceptual model, which graphically illustrates the overall scope and process of the project. New team members are trained by "super users" (those particularly proficient in a given skill or approach). These include inpatient nurses and pharmacists within the clinical units, who use the "teach-back" method that is supported with a didactic online training through the hospital's electronic portal and on-the-job observation. Training is classroom-based and varies by role, but includes multiple series of disease-specific courses (e.g., behavioral health, substance abuse), and Epic training or orientation to case management software if it is appropriate for the staff member's role. Competency is assessed using a teach-back approach for selected topics and skills.

Surveys of medical and nursing staff from the five partner SNFs involved in the hospital arm, as well as medical providers, CHWs, and HBSs from J-CHiP's community arm, show positive results. The SNF workforce survey findings suggest that the treatment protocols made a positive impact on coordination and continuity of care for patients discharged from the Johns Hopkins' facilities to the partner SNFs. SNF staff report improvement in their facility's ability to improve clinical management of common medical conditions to reduce unnecessary hospitalizations from pre- to post-implementation periods. Communication and collaboration between Johns Hopkins' ED and inpatient departments facilitated this process. Respondents report improved collaboration and teamwork in the post-implementation period, while noting that communication barriers still exist between SNFs and hospitals. In the survey of J-

CHiP's community arm, providers express satisfaction with the care that their team provides and with the care team itself. They also report that the multidisciplinary team approach is working well. Primary care providers and care managers in J-CHiP's community arm report coordination with the PAC team.

Context: J-CHiP In Its Third Year

J-CHiP has benefited from strong institutional commitments from Johns Hopkins University and affiliated Johns Hopkins institutions, partnership from community organizations in East Baltimore, and a robust, experienced internal evaluation team. J-CHiP has conducted substantial self-monitoring activities, and its analysis and reports have helped shape and publicize the intervention. Building trust in Johns Hopkins and health care professionals among residents of East Baltimore, an area that has historically had low levels of trust in the health care system, has also been an important aspect of the community intervention component. Finally, J-CHiP operates within the fiscal environment of the state's unique all-payer rate-setting commission in Maryland, the Health Services Cost Review Commission (HSCRC), which presents unique challenges and opportunities for J-CHiP as it seeks to sustain and expand intervention components over the long-term.

> "It kind of builds a new kind of trust between you and the community to have someone who lives there trying to help guide everyone in the community to health. It's going door by door, block-by-block."
> –Neighborhood Navigator

Sustaining, Replicating, and Scaling J-CHiP

J-CHiP received a 12-month NCE for its community arm through June 2016, to continue delivering services to participants enrolled in the intervention as of the end of June 2015. It is worth noting that the full intervention could not be sustained for this entire time period with the NCE funds available. Patients have continued to be served with institutional funding and support from a state HSCRC grant, as described below. In addition, the awardee has made a substantial commitment to expanding the community component to 14 additional zip codes in East Baltimore using HSCRC funding for a regional partnership. This regional partnership would include STAR and M&FC, implementation partners on J-CHiP's community arm, as well as community-based organizations that work with homeless persons, and other hospitals in Baltimore. J-CHiP received funding through the Community Health Partnerships of Baltimore grant in 2016 to refine the implementation plan and received funding for the regional partnership beginning July 1, 2016. The proposed model for the regional partnership was based on the J-CHiP program, but also includes new interventions.

The hospital arm, while no longer receiving HCIA funding, has largely continued in its entirety with institutional funding and through HSCRC reimbursement rates. J-CHiP also hopes to expand the number of hospital arm staff, including case managers, to address gaps in care for critical, underserved populations.

Summary

Hospital Arm: Our Medicare and Medicaid analyses of J-CHiP's hospital arm show significant decreases in cost of care and decreases in ED visits, while there are increases in hospitalizations and readmissions for Medicare and decreases in post-discharge practitioner follow-up visits. In the case of estimates based

on Medicare claims, we find that decrease in total cost of care is driven by decreases in outpatient costs of care. For Medicaid, we find that the observed decrease in total cost reflects greater decreases seen for beneficiaries enrolled only in Medicaid, compared to the dually eligible beneficiaries. Overall decreases in cost of care are greater for Medicaid than for Medicare. We do not observe any meaningful impacts in cost or utilization for the hospital arm's partner SNF program.

The following limitations of our analysis for J-CHiP's hospital arm should be acknowledged. We report program impacts for J-CHiP relative to a comparison group from three hospitals in Maryland. Implementation of Maryland's all-payer demonstration during the performance period precludes using hospitals from other states that participate in Medicare's Inpatient Prospective Payment System (IPPS) as comparators. In using hospitals from Maryland as comparators, we assume that the all-payer demonstration affects J-CHiP and comparison hospitals in similar fashion. While the Medicare analysis for J-CHiP's hospital arm spans the entire period of performance under HCIA funding, the Medicaid analysis does not capture impacts for the last two quarters of performance, due to limited data availability. We will report the impact of J-CHiP's hospital arm over its entire period of performance for Medicaid, in a forthcoming No Cost Extension (NCE) report.

Community Arm: In our analysis of impacts for J-CHiP's community arm, we observe significant decreases in Medicaid total cost of care. We also find significantly fewer hospitalizations and ED visits for Medicare and Medicaid beneficiaries, along with significantly fewer readmissions and potentially avoidable hospitalizations for Medicaid beneficiaries. Comparing the experiences of dually eligible beneficiaries with those enrolled only in Medicaid, we find that cost savings are greater for Medicaid only participants, while dual eligibility is associated with a greater decrease in ED visits and potentially avoidable hospitalizations.We did not observe meaningful differences in cost and utilization between beneficiaries managed by Johns Hopkins and STAR CHWs. We found few differences in outcomes of participants who had continuous contact compared to those who did not. These comparisons by dose and program type, however, are limited due to small sample sizes.

A number of limitations apply to our analysis of the community arm. We estimated impacts for the program based on an intent-to-treat assumption, so our analysis does not account for the disenrollment or attrition of participants from the program. In addition, we determined "enrollment" for the comparison group based on their having an evaluation and management visit on the claim; as a result, while both groups have similar baseline utilization and costs, the comparison group, by definition, was as likely to get care at the time of "enrollment" as J-CHiP's participants. Finally, we will report the impact of J-CHiP's community arm over its entire period of performance for Medicare and Medicaid in the forthcoming NCE report. We also plan to combine Medicare and Medicaid claims for dually eligible beneficiary-episodes,where possible, to more comprehensively understand the impact of the program on total cost of care and utilization.

References

HCIA Narrative Progress Report for the Johns Hopkins University, for Reporting Quarter End Date 9/30/2015. Johns Hopkins University, submitted 10/30/2015.

HCIA Quarterly Report for the Johns Hopkins University, for Reporting Quarter End Date 9/30/2015. Johns Hopkins University, submitted 12/9/2015.

Johns Hopkins University School of Nursing

Project Community Aging In Place, Advancing Better Living for Elders (CAPABLE). An occupational therapist (OT) and RN care manager conduct a series of home visits over 16 weeks, collaborating with the client to identify one or more goals to improve functioning and to take steps toward achieving the goal(s). The intervention takes place at the home and includes handyman services to address housing-related safety risks and improve health and functioning.

PROGRAM MODELS: Care/Case Coordination, Home Health/Home Care, Patient Navigation

LOCATION: Baltimore, MD

GRANT: $4,093,356

AWARD DATES: 11/11/12 to 1/31/16

NO-COST EXTENSION: 12 month, full program

PAYER(S): Medicare, Medicaid

REACH: 258 beneficiaries (100% of target)

POPULATIONS: Older Adults, Racial/Ethnic Minorities, Urban, Dually Eligible Beneficiaries

DATA: Medicare claims (7/12-6/15); NORC survey of participants (2015); one site visit (2014); telephone interviews with leadership (2014 to 2016)

- Ongoing challenge in recruiting participants; successful strategies included word of mouth, reliance on community partners, and support from the Maryland Department of Health and Mental Hygiene.

- Staff team comprised of OT, RN case manager, and handyman.
- In-person and online coursework focuses on patient-directed assessment and care planning, together with experiential training.

- Medicaid home- and community-based waiver services may include the program in the future.
- Strong organizational support for awardee contributed to implementation success.

OUTCOMES§

- Reduction in Medicare total cost of care after four quarters, six quarters, and ten quarters of enrollment
- An increasing trend in total cost of care over Medicaid enrollment, not statistically significant

- Trend of decrease in Medicaid hospitalizations after one year of enrollment
- Decreasing trend in Medicare emergency department (ED) visits over enrollment, not statistically significant
- Decreasing trend in Medicaid ED visits after three quarters of enrollment
- Decrease in 30-day Medicare readmissions after one, seven, and eight quarters of enrollment

- Participants reported that the OT, RN, and handyman communicated and coordinated amongst themselves to assist in accomplishing participant goals

- Participants reported improvements in their health, physical functioning, and ability to conduct daily activities independently.

Analysis limited due to small sample size.

SUSTAINABILITY, REPLICABILITY, & SCALING

During the 12-month no-cost extension for HCIA One funding, JHU SON restarted enrollment, continued to deliver services, and analyzed claims data. Pending analyses of potential cost savings are expected to be critical in determining the long-term sustainability of the CAPABLE model.

JHU SON is serving as a consultant to organizations replicating the CAPABLE program in Michigan (a pilot in Flint, Saginaw and Detroit that may be part of state Medicaid waiver services); Maine (sponsored by the Portland Housing Authority); and Australia (targeting clients with mild cognitive impairment). JHU SON is also developing new pilots in New Mexico and New York.

§Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group; summative estimates for cost and utilization do not reach statistical significance, while cost and utilization findings based on quarterly fixed effect estimates are reported here when significant, for the quarters indicated, or where at least three quarters achieve significance, are reflective of a trend. Outcomes for quality or care and health are from focus groups, interviews, and NORC's consumer survey.

Overview of Project CAPABLE

Background. Project CAPABLE provides a highly personalized combination of services to older adults who are dually eligible Medicare and Medicaid beneficiaries living independently in Baltimore, Maryland. The program aims to help beneficiaries achieve greater independence, including living in their homes longer. Project CAPABLE is a modification of the evidence-based ABLE pilot successfully tested in Philadelphia, which served as the basis of the occupational therapy (OT) protocols within CAPABLE.[114] Project CAPABLE builds on ABLE by adding both an RN and handyman services to ABLE's use of an occupational therapist.[115] Project CAPABLE brings two unique contributions to preventive home visit models: its use of OTs to initiate care planning, and its integration of the home into the innovation process itself through the use of handyman services to correct safety and health risks. RN, OT and handyman team coach clients to identify one to three functional goals and work together to achieve these goals over a 16 week period of service.

The CAPABLE pilot is supported through HCIA funds as well as through an NIH-funded randomized control trial. The awardee emphasizes replicability; over the course of the award, the awardee has worked closely with sites across the United States and internationally for consultation or replication of the program.

Goals. In addition to concentrating on the CMMI core performance measures, Project CAPABLE focuses on improving the functioning of participants and delaying their entrance to skilled nursing facilities by enabling them to live safely in their homes. Project CAPABLE defines "functioning" in multiple ways and at different levels, from reduced difficulties in performing activities of daily living (ADLs) and instrumental activities of daily living (IADLs) to greater capacity to navigate health care and home care, including self-advocacy skills and improved chronic disease self-management.

Program Models and Practices. An occupational therapist (OT) and RN care manager conduct a series of home visits over 16 weeks, collaborating with the client to identify goals to improve functioning and to take steps toward achieving the goal(s). The intervention takes place at the home and includes handyman services to address housing-related safety risks and to improve health and functioning. Each team member visits the home separately: the RN makes four visits, the OT makes six, and the handyman typically one or two.

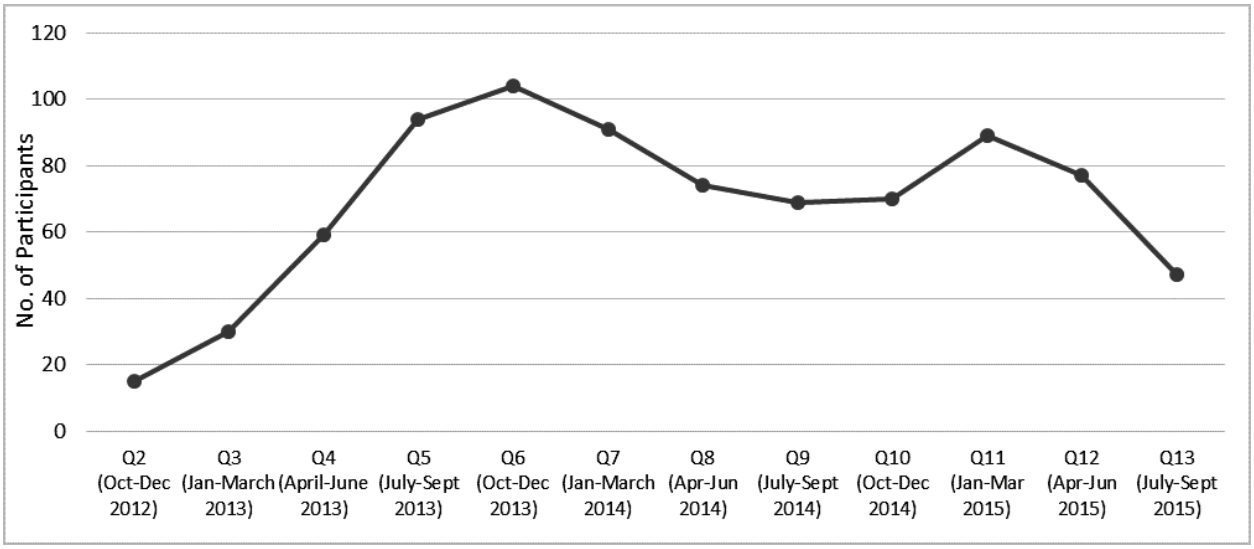
Implementation Updates. Since NORC's Second Annual Report to CMMI (2016), Project CAPABLE has made few changes to its model, as staff, operating protocols, and participants are shared between the HCIA-funded pilot and an ongoing NIH-supported double-blind (randomized control) trial of the CAPABLE model. The awardee's leadership has noted its success in retaining trained staff. Citing the ongoing challenge of recruiting participants when the intervention is not a formal part of a clinical practice or hospital department, leaders attribute their success in outreach and enrollment to strong relationships with partners such as the Maryland Department of Health and Mental Hygiene (MDHMH)

[114] Awardee application, 2012.
[115] NORC's first annual report (pp.115-118) provides a detailed case study of Project CAPABLE, including the context for the innovation and implementation experience. For more about the ABLE pilot, see Gitlin LN, Hauck WW, Dennis MP, Winter L, Hodgson N, Schinfeld S. Long-term effect on mortality of a home intervention that reduces functional difficulties in older adults: results from a randomized trial. J Am Geriatr Soc. 2009;57:476-481.

for outreach and marketing. The awardee has made a substantial commitment to replicating the model nationally and internationally, as well as exploring future avenues to sustainability locally, as Maryland hospitals and the state Medicaid program move toward value-based purchasing (e.g., inclusion of Project CAPABLE as a Medicaid waiver service or as part of an ACO). The program staff continues to offer advice and technical assistance to the many sites that are implementing or considering the CAPABLE program, including three cities in Michigan, the Housing Authority in Bath, Maine, and the Presbyterian Health Services D-SNP plan in New Mexico. The awardee is consulting with the New Jersey Medicaid waiver program and the National Center for Healthy Housing in San Diego, California and Greensboro, North Carolina, regarding their interests for including the program.

Reach and Demographic Profile of Enrolled Beneficiaries. As of September 30, 2015, Project CAPABLE, with its 16 week period of service, had served a cumulative total of 258 unique direct participants since its launch. [116] Enrollment in Project CAPABLE rose steadily through its first 12 months (through December 2013), then declined to a steady count of participants per quarter of about 70, before peaking a second time about two years post-launch (through March 2015) and declining since that time; see Exhibit JHUSON.1. During the most recent quarter for which data are available, the program served 47 unique participants. About two-thirds of the participants are between 65 and 74 years old (64 percent) and one-third are older than 75 years (36 percent). Sixty nine percent are female. Most participants are identified as Black or African American (73 percent), and 22 percent as White.

Exhibit JHUSON.1: Total Number of JHU SON Participants, by HCIA Reporting Quarter



In this chapter, we present our summative findings for the following: program effectiveness, based on analysis of Medicare and Medicaid claims as well as survey data; improved quality of care and health outcomes drawn from survey and qualitative data; and topics of workforce development, context, and

[116] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent JHU SON self-reported data available for NORC's AR3 is for HCIA reporting quarter 14, for the time period October 1 through December 31, 2015. For the purposes of this sample chapter, self-reported data are from HCIA reporting quarter 13, as used in NORC's Q9 report.

sustainability, replicability, and scaling, all updated since NORC's Second Annual Report to CMMI (2016).

Summative Findings (Outcomes)

Project CAPABLE is associated with decreasing trends in hospitalizations, as estimated using Medicare and Medicaid claims, although these changes do not reach statistical significance. Participants report consistent improvements across a range of health outcome indicators, from ADLs to measures of health-related quality of life. Participants express high satisfaction with the timeliness of the delivery of services and with the intervention overall.

In the following section, we present our analyses of program effectiveness based on three types of data: claims, both Medicare Fee-For-Service (FFS) and Medicaid; results from JHU SON's internal survey of participants; and narrative from NORC interviews and site visit focus groups.

Core Measures: Medicare Analysis

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department Visits
- 30-day Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Our community (ambulatory care) analysis compares the experiences of Project CAPABLE enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's Project CAPABLE innovation over the enrollment period as a whole and in each quarter of enrollment. Our analysis includes Medicare FFS beneficiaries, comprising 100 percent of enrollees, who are also dually enrolled in Medicaid.[117]

Finder File and Creation of Analytic Sample, Medicare. JHU SON provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[118] We identified 254 unique beneficiaries; restricting our sample to those beneficiaries identified by an enrollment date, presence of a Medicare identifier, and chronic conditions, yields an analytic sample of 172 beneficiaries.

Comparison Group, Medicare. The comparison pool consists of non-institutionalized Medicare FFS beneficiaries from the same Maryland zip codes where CAPABLE program participants reside. We used propensity score matching to find appropriate comparators.[119] We directly matched comparison beneficiaries to Project CAPABLE participants based on gender, race, and age. The final propensity score model also includes dual eligibility; Hierarchical Chronic Conditions (HCC) score; indicators for hypertension, hyperlipidemia, and diabetes; prior-year utilization (ED visits and hospitalizations) and

[117] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.
[118] Medicare claims are available through March 31, 2016, for the analysis in this report. We used December 31, 2015, as the cut-off date to account for the 90-day claims runoff.
[119] For more information on propensity score matching, please refer to Appendix C.

cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[120]

Descriptive Characteristics, Medicare Analysis. Exhibit JHUSON.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, comorbidities, and prior utilization, for which we observe no differences.[121]

Exhibit JHUSON.2: Descriptive Characteristics for Project CAPABLE and Comparison Group Medicare Beneficiaries

Variable	JHU SON	Comparison
Number of Persons	172	172
Mean Number of Quarters Enrolled [Range]	7.2 [1-13]	7.2 [1-13]
Gender % (N)		
Female	80.8 (139)	80.8 (139)
Age Group % (N)		
65-69 years	33.7 (58)	33.7 (58)
70-74 years	22.7 (39)	22.7 (39)
75-79 years	13.4 (23)	13.4 (23)
80-84 years	17.4 (30)	17.4 (30)
≥85 years	12.8 (22)	12.8 (22)
Race/Ethnicity % (N)		
White	20.9 (36)	20.9 (36)
Black	75.6 (130)	75.6 (130)
Other	3.5 (6)	3.5 (6)
Dual Eligibility % (N)		
Dual Enrolled	77.3 (133)	77.3 (133)
Coverage Reason % (N)		
Age	65.7 (113)	65.1 (112)
Disability	34.3 (59)	34.9 (60)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)	1.8 (1.2)	1.8 (1.3)
Mean Count of HCCs (SD)	2.8 (2.3)	2.7 (2.6)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost (SD)	$18,055 ($25,335)	$17,757 ($33,008)
Hospitalizations (SD)	454 (874)	529 (1,078)
ED Visits (SD)	657 (1,192)	640 (1,422)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of Project CAPABLE Program, Medicare. Exhibit JHUSON.3 displays the average quarterly and aggregate impact of the Project CAPABLE innovation on its participants relative to the comparison

[120] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.
[121] We tested differences between these groups with 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).

group.[122] We reported utilization measures as binary indicators, noting whether an event occurred in each patient quarter for a specific beneficiary (beneficiary-quarter).[123] We find the following, relative to the comparison group:

- **Cost:** a non-significant increase in total quarterly cost of care.
- **Utilization Measures:** non-significant decreases in hospitalizations and 30-day readmissions and a non-significant increase in ED visits.
- **Quality of Care:** a non-significant increase in ambulatory care-sensitive hospitalizations.

Exhibit JHUSON.3: Impact of Project CAPABLE Program on Outcomes for Medicare Beneficiaries

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	$93 [-$1,076; $1,262]
Hospitalizations	-5 [-34, 24]
ED Visits	2 [-30, 34]
30-Day Readmissions	-71 [-183, 41]
Ambulatory Care-Sensitive Hospitalizations	7 [-7, 21]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$108,576 [-$1,495,888; $948,714]
Hospitalizations	-6 [-40, 28]
ED Visits	2 [-36, 40]
30-Day Readmissions	-8 [-21, 5]
Ambulatory Care-sensitive Hospitalizations	7 [-7, 21]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (172), with an average length of program enrollment of 7.2 quarters, ranging from 1-10 quarters.

Impact of Project CAPABLE Program in Each Quarter of Enrollment, Medicare. Findings from a quarterly fixed effects (QFE) DID model of impact for hospitalizations and ACS hospitalizations are consistent with the average quarterly impact summarized above. Exhibit JHUSON.4 displays the results of the QFE DID model for ED visits, 30-day readmissions, and total cost of care.[124] Adjustment factors include age category, race/ethnicity, length of FFS coverage, dual eligibility indicator, HCC score, and disability indicator. We observe the following, relative to the comparison group:

- **Cost:** No overall trend for total cost of care; however, there are statistically significant decreases in quarters I4, I6, and I10.

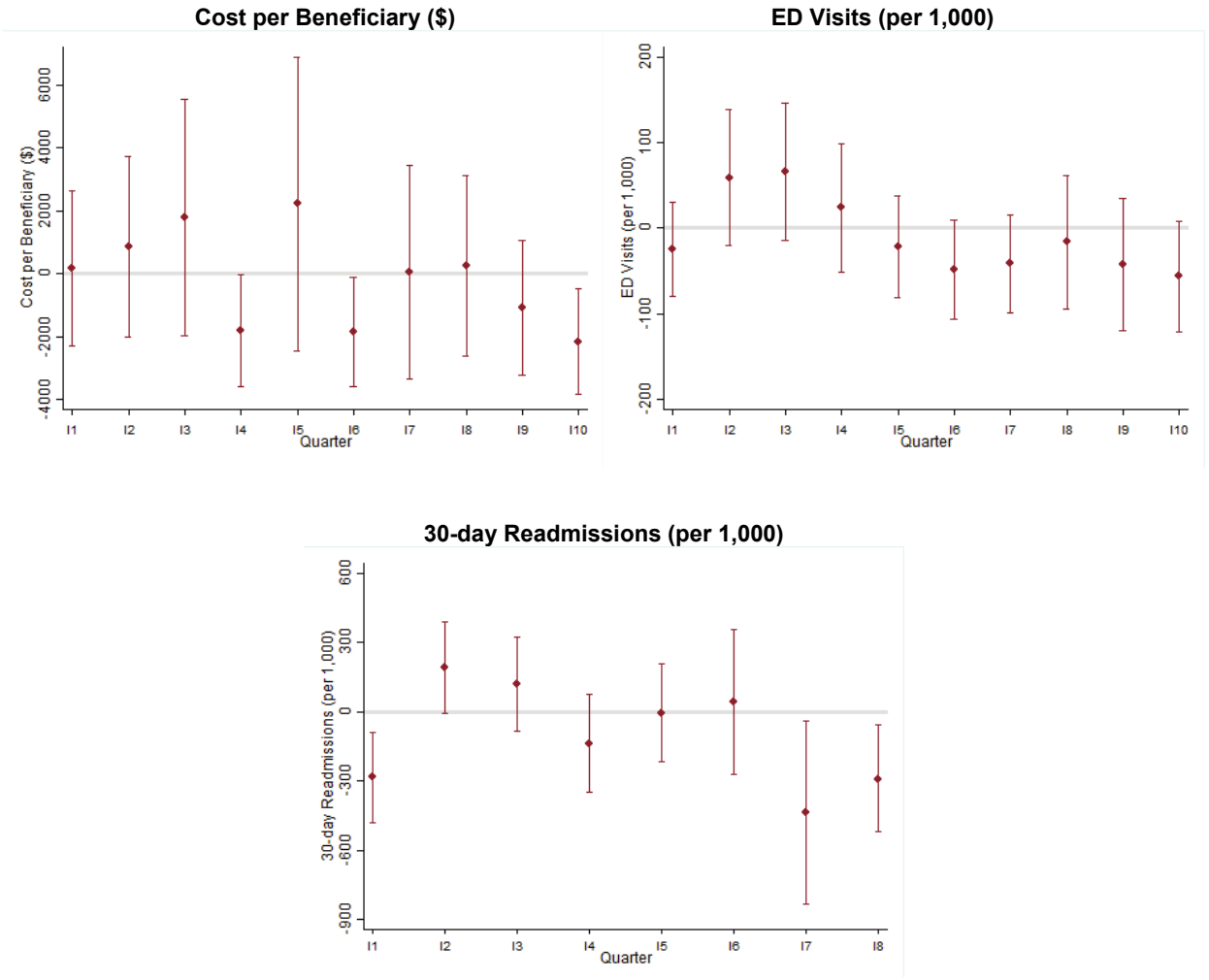
[122] Adjustment factors include age category, race/ethnicity, extent of FFS coverage, dual eligibility indicator, HCC score, and disability indicator.

[123] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

[124] For total cost of care, this effect is displayed per beneficiary. For utilization measures, the effect is displayed as the average difference between treatment and comparison per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1–I10) period, after adjusting for pre-intervention differences between the two groups. See Appendix D for a more detailed explanation of the QFE DID models and measure specification.

- **Utilization Measures:** No statistically significant changes in ED visits, although there is a decreasing trend after one year of program enrollment (quarters I5–I10); no overall trend for 30-day readmissions, although statistically significant decreases are observed in quarters I1, I7, and I8.

Exhibit JHUSON.4: Impact of Project CAPABLE Program on Outcomes for Medicare Beneficiaries, by Quarter



Core Measures: Medicaid

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department Visits

Our community (ambulatory care) analysis compares the experiences of JHU SON enrollees with those of a matched group of comparators, considering the impact on utilization and cost of the awardee's Project CAPABLE innovation over the enrollment period as a whole and in each quarter of

enrollment. Our analysis examines Medicaid or dually eligible beneficiaries, comprising 100 percent of Project CAPABLE enrollees, who are dual eligibles.[125]

Finder File and Creation of Analytic Sample, Medicaid. JHU SON provided a finder file of program participants and enrollment dates, enabling us to use Maryland Medicare claims for these beneficiaries to calculate outcome measures.[126] We identified an analytic sample of 207 unique beneficiaries.

Comparison Group, Medicaid. The comparison pool consists of non-institutionalized Medicaid patients in the same Maryland zip codes as CAPABLE program participants. We use propensity score matching to find appropriate comparators.[127] The final propensity score model includes age; race; gender; Chronic Illness and Disability Payment System (CDPS) risk score; and prior-year utilization (ED visits and hospitalizations) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[128]

Descriptive Characteristics, Medicaid Analysis. Exhibit JHUSON.5 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, CDPS risk score, and prior utilization.[129] We observe no differences in demographics, CDPS risk score, or prior utilization measures.

Exhibit JHUSON.5: Descriptive Characteristics for Project CAPABLE and Comparison Group Medicaid Beneficiaries

Variable	JHU SON	Comparison
Number of Persons	207	207
Mean Number of Quarters Enrolled [Range]	7.5 [3-11]	7.5 [3-11]
Gender % (N)		
Female	84.5 (175)	82.6 (171)
Age Group % (N)		
65-69 years	30.9 (64)	29.0 (60)
70-74 years	26.1 (54)	30.4 (63)
75-79 years	14.5 (30)	16.4 (34)
80-84 years	17.9 (37)	13.5 (28)
≥85 years	10.6 (22)	10.6 (22)
Race/Ethnicity % (N)		
White	14.0 (29)	15.9 (33)
Black	81.2 (168)	79.7 (165)
Other	4.8 (10)	4.3 (9)
Dual Eligibility % (N)		
Dual Enrolled	67.6 (140)	66.7 (138)

[125] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[126] Maryland Medicaid files are available through July 31, 2015, for the analysis in this report.

[127] For more information on propensity score matching, please refer to Appendix C.

[128] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[129] We test differences between these groups using a t-test for continuous measures (CDPS risk score and utilization before index hospitalization) or a chi-square test for categorical parameters (gender, age, race, and dual eligibility).

Variable	JHU SON	Comparison
Chronic Illness and Disability Payment System (CDPS) Risk Score		
Mean CDPS Risk Score (Standard Deviation)	1.9 (1.9)	1.8 (2.0)
Mean Utilization and Cost in Year Prior to Program Enrollment		
Total Medicaid Cost (SD)	$5,339 ($17,326)	$5,794 ($15,715)
Hospitalizations per 1,000 (SD)	208 (558)	213 (678)
ED Visits per 1,000 (SD)	517 (1379)	411 (1057)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of Project CAPABLE Program, Medicaid Analysis. Exhibit JHUSON.6 displays the average quarterly and aggregate impact of the CAPABLE innovation on its participants relative to the comparison group.[130] Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[131] We find the following for the Project CAPABLE program, relative to the comparison group:

- **Cost:** A non-significant increase in total quarterly cost of care.
- **Utilization Measures:** Non-significant decreases in hospitalizations and ED visits.

Exhibit JHUSON.6: Impact of Project CAPABLE Program on Outcomes for Medicaid Beneficiaries

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	$403 [-$443; $1,249]
Hospitalizations	-12 [-28, 4]
ED Visits	-9 [-29, 11]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$565,688 [-$622,140; $1,753,516]
Hospitalizations	-6 [-38, 6]
ED Visits	-13 [-42, 16]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (207), with an average length of program enrollment of 7.5 quarters, ranging from 1-8 quarters.

Impact of Project CAPABLE Program in Each Quarter of Enrollment, Medicaid. Findings from a QFE DID model of impact provide additional details that are not consistent with the average quarterly impact summarized above. Exhibit JHUSON.7 displays the results of the QFE DID models for total cost

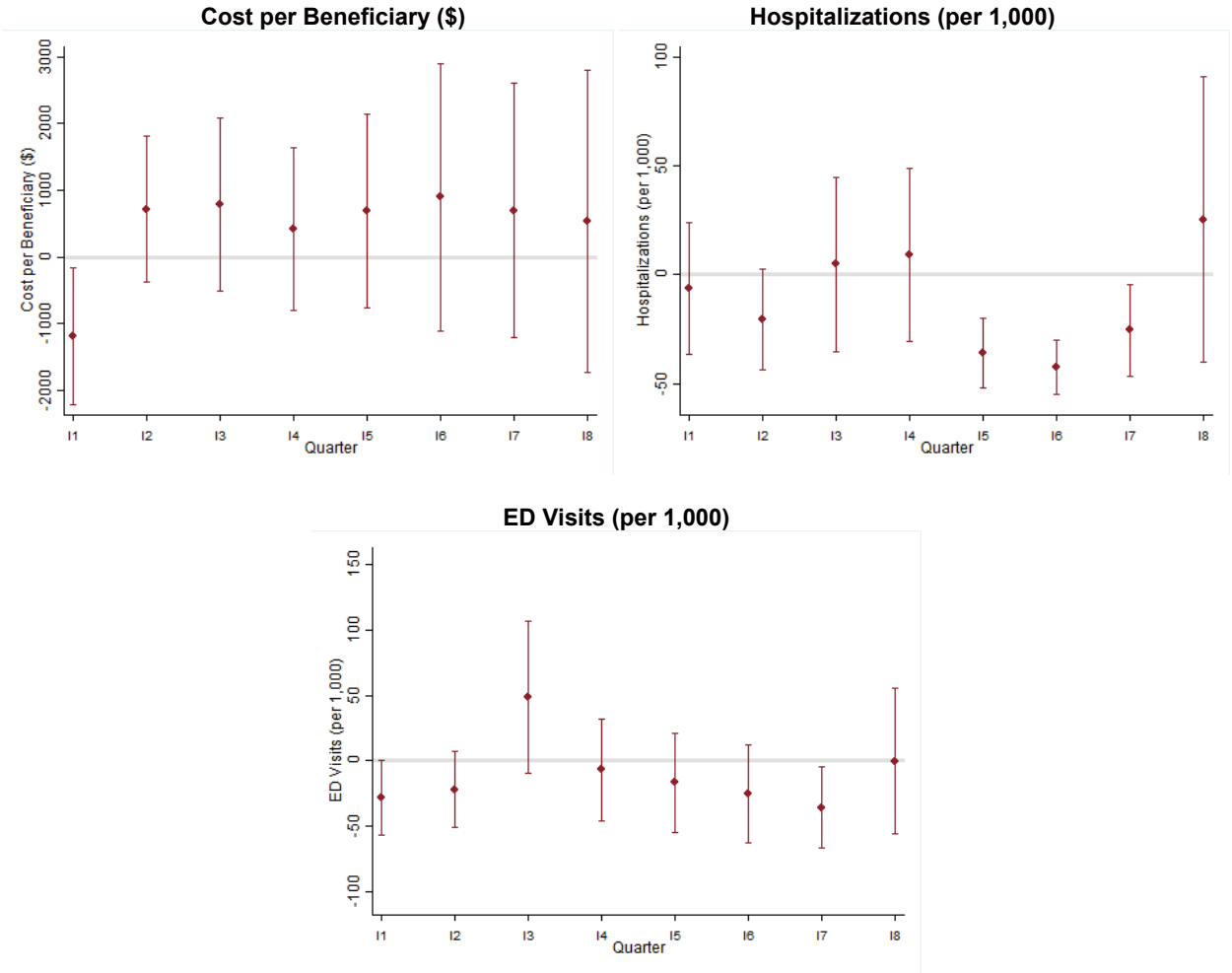
[130] Adjustment factors include age category, gender, race/ethnicity, dual eligibility indicator, and CDPS risk score.

[131] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

of care, hospitalizations, and ED visits.[132] Adjustment factors include age category, gender, race/ethnicity, dual eligibility indicator, and CDPS risk score. We find the following, relative to the comparison group:

- **Cost:** A significant decrease in cost is observed in the first post-intervention quarter, followed by an increasing trend over the subsequent post-intervention quarters.
- **Utilization Measures:** A decreasing trend in hospitalizations after one year of enrollment in the program, achieving significance in quarters I5–I7; a decreasing trend in ED visits after three quarters of enrollment in the program, with a significant decrease observed in quarter I7.

Exhibit JHUSON.7: Impact of Project CAPABLE Program on Outcomes for Medicaid Beneficiaries, by Quarter



[132] For total cost of care, this effect is displayed per beneficiary. For utilization measures, the effect is displayed as the average difference between treatment and comparison per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1–I8) period, after adjusting for pre-intervention differences between the two groups. See Appendix D for a more detailed explanation of the QFE DID models and measure specification.

Quality of Life and Health (Survey and Qualitative Findings)

NORC's assessment of Project CAPABLE's impacts on health and quality of care uses data reported by the awardee from an internal survey of participants, supplemented with findings from a focus group and in-person interviews with program participants. JHUSON conducted the survey at baseline and 5 months post-enrollment (n=281 as of June 30, 2015, with an analytic sample size of 190).[133, 134] Survey items include a reassessment of ADLs (e.g., bathing, grooming, transferring, toileting, eating, walking across a small room); IADLs (e.g., meal preparation, light housework, shopping for personal items, making telephone calls, laundry, taking medications, managing money); and health-related quality of life (including self-reported functioning, depressive symptoms, and fall prevention self-efficacy). Most survey respondents are Black (82 percent) and female (86 percent), with no more than a high school education (88 percent). The average age of participants is 74 years. Please see Appendix F for the complete set of survey findings.

Improved Physical Functioning. At baseline, participants reported difficulty with an average of 4.06 ADLs of the eight that were measured (SD=1.97). After five months in Project CAPABLE, respondents noted a significant reduction in difficulties to 2.15 ADLs (SD=2.01).[135] There was also a statistically significant decrease in difficulties with IADLs from an average of 4.11 at baseline (SD=2.07) to 3.05 after five months (SD=2.22).[136] Seventy-five percent reported a decrease in the number of ADLs that posed some to a lot of difficulty; this number stayed the same for 15 percent and increased for 10 percent.[137] We see similar proportions for IADLs, with 62 percent of participants reporting decreases, 23 percent reporting no change, and 15 percent reporting increases.

Several focus group participants described how the program increased their ability to do activities they were previously not able to do, such as walking up the stairs, vacuuming, and getting into the tub. These improvements were likely due both to the improvements made to their home (e.g., adding railings on stairways, shower chairs, shower grab bars), and to improvements in physical functioning resulting from exercises the OTs taught them. Participants described how they continue to do the exercises the OT taught them, even after the visits were over. One participant noted "It didn't stop on that last visit, because I still carry out what I was taught. I do my exercises in bed. If I keep carrying it out then my health will last longer. What I learned has allowed me to move around more. I was sitting too much before." With respects to IADLs, focus group participants discussed how

> "I have one of those medication organizers now and I wasn't doing it before, but now I separate what I'm supposed to take at certain times. They got me doing that. And that does make me feel better than when I took it at the same time. I wasn't giving it the chance to do what it was supposed to do. And now I tell my husband to do the same thing with his medication. It taught me something."
>
> --Focus group participant

[134] A review of data from the first 100 participants is summarized in Szanton, Sarah L., Jennifer L. Wolff, Bruce Leff, Laken Roberts, Roland J. Thorpe, Elizabeth K. Tanner, Cynthia M. Boyd et al. "Preliminary Data from Community Aging in Place, Advancing Better Living for Elders, a Patient-Directed, Team-Based Intervention to Improve Physical Function and Decrease Nursing Home Utilization: The First 100 Individuals to Complete a Centers for Medicare and Medicaid Services Innovation Project." *Journal of the American Geriatrics Society* 63, no. 2 (2015): 371-374.

[135] T-Test for this reported change, $t(189) = 13.3$, $p < .001$.

[136] T-test for this reported change, $t(189)=8.13$, $p<.001$.

[137] For both ADLs and IADLs, N=190 respondents.

the RN care manager helped them better manage the many medications they were taking. One participant noted: [My doctor] was impressed that I was taking my medication on time – and I wasn't taking it on time before – and that was putting me in danger."

Improved Health-Related Quality of Life. Participants were asked to rate their current health on a scale from 1 (no problem with performing activity) to 3 (unable to perform activity). From baseline survey to reassessment at five months post-enrollment, we see a near tripling in the percentage of participants with no difficulty performing usual activities (e.g., work, study, housework) or walking. The number of participants reporting no difficulties with self-care started off the highest and increased by roughly 20 percentage points.

Focus group participants described improvements in their health, and ability to return to activities they had previously been unable to do. One participant noted that she could work to church again. Two focus group participants noted that their main goals included increasing their mobility in and around their homes. Having the OT walk through the home with them to identify issues taught participants about dangers and opportunities for improvements they did not know were possible. One participant noted that, "it was a struggle, but I didn't think it could get better. I didn't know you could change my home…when [the handyman] came in, it made everything better!" Another noted she previously had to crawl up the stairs, and out of the tub, and is now able to walk.

The survey also addressed some specific components of health-related quality of life.

- **Fewer Depressive Symptoms.** Participants were also asked to rate how often they had been bothered by a series of problems over the past two weeks (e.g., feeling down, trouble falling asleep, feeling tired, poor appetite) at both baseline and reassessment, to measure depression. For those who reported depressive symptoms at baseline and had complete data at reassessment (Patient Health Questionnaire-9 score < 5, N=96), depressive symptoms significantly decreased from an average of 10.04 (SD=4.63) to an average of 6.69 (SD=5.04).[138]

- **Improved Fall Prevention Self-Efficacy.** To assess improvement in fear of falling, or fall prevention self-efficacy, 187 participants rated their confidence in being able to perform 10 activities without falling (e.g., taking a bath or shower, getting in and out of bed, getting dressed or undressed). Confidence in fall prevention was measured at baseline and five months post-enrollment, along a 1 to 10 scale, with 1 being very confident and 10 being not confident at all. These scores were summed across all 10 items to create a confidence score for each participant, where a lower score indicates greater fall prevention self-efficacy. At baseline, participants reported an average confidence score of 36.65 (SD=20.00), which improved significantly at five months, to 27.71 (SD=18.93).[139]

[138] T-Test for this reported change, $t(95)=6.45$, $p < .001$.

[139] T-test for this reported change, $t(186)=6.70$, $p < .001$

> "I used to stay down on my main floor and now I get up better. And one of them told me, if you don't go out, go up and down the steps a certain amounts of time a day. With only one railing you need more balance, but with two railings I can go at my own pace. I feel safer. I don't have to worry about slipping. "
>
> --Focus group participant

Focus group participants reported that the OT helped them identify fall hazards in their home, which the handyman in many cases helped to remediate. The OT also taught them the necessary skills to avoid falls (e.g., by moving more slowly and deliberately), and how to get from a fall.

Workforce Development

The awardee's novel staffing model endured over the project period and received high ratings of staff satisfaction. An OT led the assessment process, alternating appointments with the RN and handyperson over the 16-week intervention period. Training included both formal didactic and informal experiential components.

Staffing. The clinical staffing model consists of a three-person team— an OT, RN, and handyperson (HP)—that visits each participant's home. Each team member visits the home separately: the RN makes four visits, the OT makes six, and the HP typically one or two. The RN assesses issues such as medication management, participant activation, strength/balance, mental health (e.g., depression), and pain and provides services such as participant education; communication with the primary care physician (PCP); advocacy as needed on issues such as pain medication; and problem solving with the participant (e.g., identifying ways to reduce social isolation). The OT acts as a consultant rather than as a practitioner, providing a safety assessment of the house, such as the need for grab bars in the bathroom; observing the participant; and assessing the participant's needs in order to support continued in-home living, including the need for adaptive devices. The OT determines the work the HP should do and checks the work of the HP. JHU SON had not employed most of the intervention team before the pilot.

Although each team's RNs and OTs conduct client visits separately, RNs and OTs across the care teams meet twice a month with the project director to discuss the intervention overall, as well as the progress and the challenges of current patient cases. Participants recognized that the OT, RN, and handyman communicated and coordinated amongst themselves to assist in accomplishing participant goals.

Interviews that NORC conducted during its site visit suggest a number of reasons for the low turnover among the intervention staff, including the following:

- **Rewarding work:** Team members enjoy the contact with participants and the professional challenge of making patient-directed care succeed.
- **Meaningful relationships:** OTs in particular report that the opportunity to cultivate a more in-depth relationship with patients is unusual in their field, and that this position is a welcome contrast to the more limited and highly structured clinician-patient relationship typical in hospital settings.

- **Dedication to the intervention:** People are committed to the model and to making it work.
- Focus group participants similarly described the warm relationships they developed with program staff. Staff were reportedly kind and always professional. As one participant shared: "I know it was short term but I felt like they were my daughters. They wanted me to do what was best for me. It didn't matter if we got off track; she always got back to what she needed to talk to me about."

> "I think we all feel a sense of purpose here. That is the unifying entity that keeps us focused—we all either have parents or aging family members, so this is relative to all of us, if not now then at some point. That realization makes it more personalized and lets CAPABLE, the team, function well. It's personalized and purposeful. It's not an abstract 'why am I doing this' feeling."
> -- CAPABLE staff member

Training. As noted above, the program provides training in the assessment skills and evidence-based tools that enable both OTs and RNs to engage in a client-centered approach. This includes motivational interviewing techniques, use of problem solving, and specific strategies to engage participants in their self-care management. Initially, JHU SON trained OTs and RNs with face-to-face methods. Later, the program provided videotaped training in some aspects of the care model, e.g., how to do an initial OT home assessment, as well as videotaped participant visits to support training in scaled settings.

Implications for Workforce Development. The program has been able to attract and retain a small group of highly dedicated OTs and RNs, largely by providing a professionally appealing intervention and professional autonomy. Focus group participants favorably contrast this work to the much more structured working environment of a hospital. The strong local value of the Hopkins brand has also played a role in morale and interest in the program.

Context: Project CAPABLE In Its Third Year

Project CAPABLE has operated as a relatively small, self-contained innovation that has benefitted from strong partnerships with local key stakeholders (Maryland DHMH, AmeriCorps), strong support from its host organization (the Johns Hopkins University School of Nursing), and the positive reputation of JHU SON in the community. The principal investigator's previous experience in this area has been key to success, for example, in circumventing the current Maryland legal limitation on OTs opening cases by classifying the team OT as a consultant rather than staff. Leadership has been involved in the day-to-day management of the innovation, including training, and has allowed a high level of involvement in operations, training, and replicability work.

Sustaining, Replicating, and Scaling: Project CAPABLE

Sustainability. JHU SON continues outreach, replicability work and analysis of claims data through the end of its award period. Program staff continue to engage with the program through providing guidance and technical assistance to sites implementing their own pilot versions of CAPABLE.

> "We got a [foundation] grant to help work with the business development consultant to get through their pipeline. Our next meeting with them is making a canvas business model, what are the channels of scaling, what are the pros and cons, what assumptions do you need to test, and if they fund the next phase, it would be a series of experiments to test those assumptions."
> –Awardee leadership

Replicability and Scaling. While pending analyses of potential cost savings are expected to be critical in determining the long-term sustainability of the CAPABLE model and prospects for replication by state Medicaid programs and agencies, program staff have already been involved with replication efforts across the United States. For example, in Michigan, three cities, Flint, Saginaw and Detroit, are implementing a pilot version of CAPABLE. The program is integrated into the state Medicaid waiver, which has begun enrolling participants and, pending results, could scale up to be included in standard state Medicaid waiver services. Also in Michigan, the Priority Health Medicare Advantage plan has received permission from the Centers for Medicare & Medicaid Services (CMS) to add CAPABLE services, especially utilizing the OT and RN visits post-hospitalization. The Bath (Maine) Housing Authority is implementing a modified version of CAPABLE, focusing on the handyman services for home modifications to encourage aging safely in place. The National Center for Healthy Housing will be replicating the CAPABLE model in four regions under their Aging Gracefully program, supported by foundation funding. JHU SON will be training program staff. JHU SON will also be providing technical assistance to two Medicare Advantage programs considering adding CAPABLE as a benefit or as part of case management programs. CAPABLE staff are in conversation with sites in several other states and entities, including an Accountable Care Organization (ACO). Internationally, the program has been implemented in Australia, targeting clients with mild cognitive impairments.

Summary

Project CAPABLE has operated as a relatively small, self-contained innovation that benefited from strong partnerships with local key stakeholders, strong support from its host organization, and the positive reputation of JHU SON in the community. The awardee's novel staffing model—including an OT, RN, and handyperson—endured over the project period and resulted in high staff satisfaction.

We see decreases in hospitalizations and increases in total cost of care in both the Medicare and Medicaid analyses relative to the comparison group; however, significance is not achieved in either data source. The Medicare analyses show non-significant increase in ED visits; conversely, a non-significant decrease in ED visits is seen in the Medicaid analyses, relative to a comparison group. The survey data reflects an improvement in health-related quality of life, decreased depressive symptoms, and improved fall prevention self-efficacy. The survey had statistically significant reduction for difficulties in ADL and IADL. In addition, Project CAPABLE receives high marks from participants and their caregivers, and an array of health indicators show improvement for persons enrolled in the intervention.

Beneficiaries enrolled in Project CAPABLE have functional limitations and complex health care needs, so small increases in rates of health care utilization over time are not surprising. However, both Medicare and Medicaid analyses suggest a decrease in admissions and ED visits after one year in the intervention. In addition, relatively small sample sizes for both claims analyses may limit analytic power and introduce bias. While cost analyses are still incomplete, the program has garnered widespread publicity and attention. Since ending care delivery in June 2015, the program staff has focused on scaling the CAPABLE program through replicability sites. Although the program model was designed in line with Home and Community-Based Services (HCBS) waivers available through Medicaid and Medicare, staff have encouraged sites to adapt the model to their particular needs. By pursuing various settings, funders and environments, the awardee hopes to ensure the sustainability of the program model.

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LifeLong Medical Care

Complex Care Initiative (LCCI). Federally-qualified health center (FQHC) LifeLong Medical Care offers clinic-based care coordination and client engagement to high-risk adults. The innovation includes home visits integrated with peer-coaching and workshops focused on independent living (IL) skills offered by implementation partner, the Center for Independent Living (CIL).

PROGRAM MODELS: Care/Case Coordination, Collaborative Medical Home, Independent Living Skills, Patient Navigation

LOCATION: Berkeley, CA

GRANT: $1,109,231

AWARD DATES: 12/27/12 to 12/31/15
NO-COST EXTENSION: 6 months
PAYER(S): Medi-Cal, Medicare

REACH: 317 beneficiaries (89% of target)
POPULATIONS: Behavioral Health/Substance Abuse, Disability, Dually Eligible, Limited English Proficiency, Racial/Ethnic Minority, Urban
DATA: Medi-Cal claims (2013- 2015); NORC consumer survey; one site visit (2014); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Collaboration between LifeLong and CIL created culture change, and cross training of staff for medical and IL philosophy perspectives.
- Integration of peer coaches (PCs) into clinical setting.
- Challenges in maintaining billable hours for peer coaches.
- Difficult to integrate PC and RN into clinic workflow when they serve only a subset of FQHC clients.

WORKFORCE

- Interdisciplinary training of LifeLong clinicians and CIL peer coaches.
- Experiential training for program staff, e.g., shadowing.

CONTEXT

- Health plan reimbursement for part of intervention.
- More success at LCCI integrating team in clinics that had a culture of innovation (open to changes in workflow).

OUTCOMES§

UTILIZATION

- Decrease in hospitalizations (-148 per 1,000 beneficiaries per quarter) during second year of enrollment
- Decrease in emergency department visits (-150 per 1,000 beneficiaries per quarter), during second year of enrollment

QUALITY

- 91% of consumers were satisfied or very satisfied with LCCI
- 90% said that it was easier to get the care they needed
- 90% said LCCI helped them have more control over their health care

HEALTH

- 80% said LCCI helped them avoid bigger problems with their health
- 82% said LCCI helped them take better care of themselves

Analysis limited due to lack of claims data on cost.

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

LCCI no longer provides services to clients. However, LifeLong is applying lessons learned about integrated team approach in provision of health care in its clinics to ensure that social needs are met for patients.

REPLICABILITY & SCALING

While the LCCI program is no longer active, the innovation helped LifeLong design and develop a custom component for its NextGen electronic health record to support nurse care management, peer coaching, and other services that are not linked to a medical or behavioral health visit. CIL is exploring ways to market peer coaching and Living Well Workshops to payers in capitated payment environments.

§Outcomes for utilization are from analyses that include a comparison group and are statistically significant at the $p<0.01$ level. Outcomes for quality of care and health are from NORC's consumer survey, focus groups, and interviews.

Overview of the LifeLong Complex Care Initiative

Background. The LifeLong Complex Care Initiative (LCCI) is a partnership between two organizations based in Berkeley, California: LifeLong Medical Care, a group of federally qualified health centers (FQHCs), and the Center for Independent Living (CIL), a national leader in disability rights. Both organizations serve populations in Alameda County, California. LCCI targets Medi-Cal beneficiaries who are enrolled in one managed care health plan, the Alameda Alliance for Health (AAH). They are adults identified as at high-risk for emergency department (ED) utilization and avoidable hospitalizations, with multiple chronic conditions and often unaddressed social needs including housing, food insecurity, and transportation to access health care. LCCI serves a targeted population of Lifelong's FQHC clients. The awardee created the LCCI in anticipation of Cal MediConnect, California's financial alignment demonstration; however, the demonstration was not be implemented in Alameda County. LCCI launched on February 26, 2013.

The awardee's model is a new one, although it does include an existing, evidence-based chronic disease self-management program called Living Well. LifeLong Medical Care has 11 years of experience operating Project RESPECT, a program to reduce emergency department visits, hospitalizations, and readmissions among people who are frequent users of these systems. LifeLong was one of seven partners in Alameda fielding Project RESPECT (California HealthCare Foundation, 2008). In the RESPECT program, LifeLong uses an interdisciplinary team to provide intensive outreach, case management, primary care, mental health care, housing assistance, benefits advocacy, and transportation assistance. LifeLong applied several lessons it learned from Project RESPECT to its HCIA-funded project, including the value of strong collaborations with non-clinical community partners, and the importance of hiring staff experienced in working with a target population with multiple chronic conditions and significant psychosocial needs related to housing, transportation, food, and other non-medical areas. LifeLong's approach to client engagement, however, appears to differ from that of Project RESPECT; while Project RESPECT uses linkages to housing, benefits, and medical and mental health care, LCCI emphasizes participant activation toward self-advocacy through peer-led coaching and independent living skills workshops.

Goals. Although LCCI shares CMMI's interest in reducing hospital admissions and providing high-value care, the awardee's key objectives relate to empowering participants to better manage their own health and living situations, and gain greater independence. In some cases, achieving these objectives might be expected to result in greater, more appropriate utilization and potentially higher associated costs, as a result of improved access to care. Priority populations within the target group include people with limited English proficiency (preferred language of Spanish), urban dwellers, and those living with disability. Risk score-based targeting yielded prospective enrollees more likely to have behavioral health needs (primarily anxiety and depression) and psychosocial challenges (unstable housing, poverty, isolation).

Program Model and Practices. LCCI's unique hybrid of clinic-based integrated care delivery, care coordination, home visits, and independent living engagement is delivered by a team that includes a nurse care manager (NCM) employed by LifeLong and a peer coach (PC) affiliated with CIL; the PC is not part of the FQHC's medical team and does not have access to the clinic's electronic health records (EHR). The program takes a

LifeLong Primary Care Sites for HCIA Grant
- Berkeley Primary Care
- West Berkeley
- Over 60 Health Center

holistic approach to address the medical and social needs of participants, providing clinical case management by an RN care manager embedded in each of LifeLong's three clinic sites and peer support through one-on-one coaching and workshops. CIL's Living Well Workshops are led by the PCs and use an evidence-based curriculum (Living Well with a Disability[140]). AAH reimburses for both the one-on-one coaching and Living Well Workshops rendered by PCs.

Implementation Update Since NORC's Second Annual Report. While the awardee received a six month no-cost extension (NCE) through December 31, 2015, clients were not served or recruited during this time; rather, the awardee and its implementation partners focused on sustaining elements of LCCI and planning for future replication. Much of the data related to LCCI's implementation experience were analyzed and presented in earlier NORC reports to CMMI; please see NORC's Second Annual Report (2016) for more information. Noteworthy evaluation findings since preparation of NORC's Second Annual Report include the following:

- **Health Information Technology.** LifeLong describes a major outcome of HCIA funding as the design and piloting during the NCE period of a new EHR template for the FQHC's NextGen system. The template includes an off-the-shelf component enabling reimbursement for CCM services—now allowable for FQHCs—as well as custom sections to document client goals and information relevant to social determinants of health. It is intended to support nurse care management, peer coaching, and other services that are not linked to a medical or behavioral health visit.
- **Staffing.** After it faced continued difficulties in recruiting and retaining staff, LCCI moved to make PC and NCM roles more flexible by splitting a full-time RN job into two part-time positions at a single site, and merging two part-time Peer Coach jobs into one full position that worked at two clinic locations. LifeLong has focused on developing an expanded team model, where clinicians collaborate with non-clinical staff members who address the social determinants of health that impede access to care, such as housing or transportation.
- **Recruitment and Targeting.** LifeLong added Living Well Workshops in Spanish as soon as a Spanish-speaking Peer Coach was hired. In LCCI's third year, the awardee gained access to data about ED visits from local hospitals, which helped refine targeting.

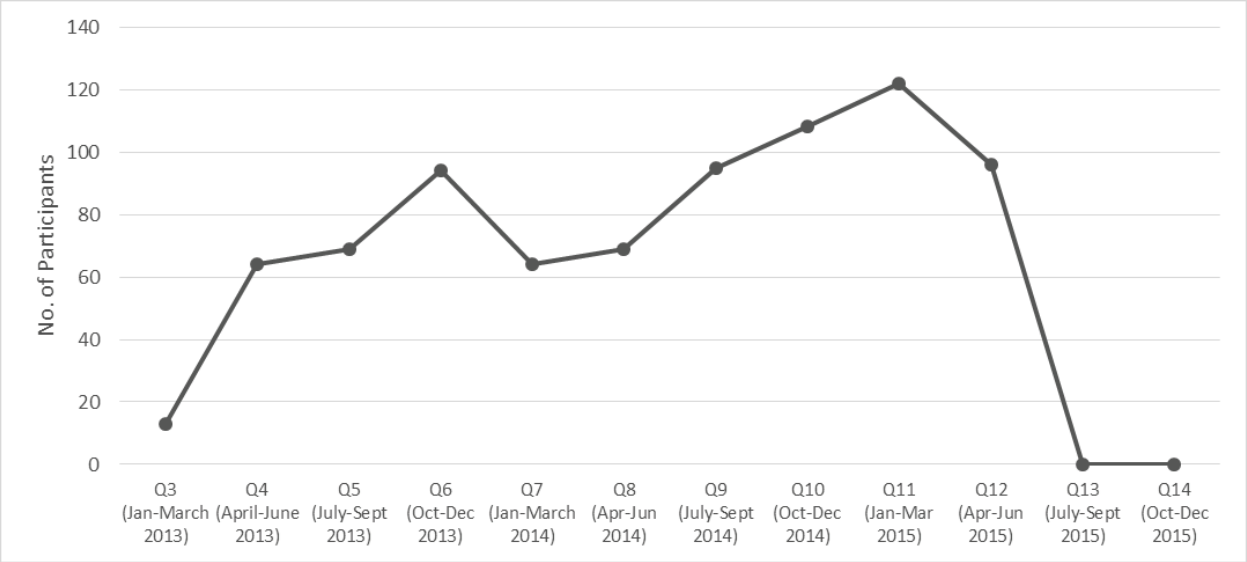
> "For the HCIA project we used the ACG risk scores, who were the providers most worried about because that's a good indicator of risk, but it relied on the providers too much. So we are going to need to develop a uniform assessment tool. Because we are a large organization, that's a huge project. Developing a tool was an important outcome. Our [new] EHR template is not an assessment tool, it's a communication tool. Our organization is so big and population so diverse, that it's hard to determine an assessment tool that works for everyone."
>
> –Clinic Administrator, LCCI

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from LifeLong for the LCCI provide participation by HCIA reporting quarter, as seen in Exhibit LCCI.1. There was an initial rise in enrollment through Q6, followed by a dip during Q7 and a second rise in enrollment to a peak during Q11. At any one point in time, the census of enrollees may include those who moved into and out of the program in past quarters. During the final quarter of performance under the initial period of HCIA funding (April 1 through June 30, 2015), the awardee reports serving 96 beneficiaries; no clients were

[140] Living Well with a Disability was developed by the Rural Institute at the University of Montana. The work was funded by the National Institute on Disability and Rehabilitation Research Grant No. H133B030501, H133B70017-01; and Centers for Disease Control Grant No. R04/CCR818823-01, R04/CCR914204, R04/CCR814162, U59/CCU821224-01, R04/CCR808519-03-1.

served during the NCE period through December 31, 2015. As of December 31, 2015, the LCCI had served a total of 317 participants since program launch, 89 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 Reporting Quarter



For the group of participants directly served during the period from April 1 through June 30, 2015, over two-thirds are between ages 26 and 64 (69 percent), 19 percent are 65 to 74, and 12 percent are at least 75. More females (62 percent) than males are enrolled. Slightly over half are African American (51 percent), nearly one-quarter are white (23 percent), 14 percent are Hispanic or Latino, and 4 percent are Asian. Fourteen percent have an unknown or unreported race or ethnicity.

In this chapter, we present our summative findings for program effectiveness, based on analysis of Medi-Cal health plan claims data; findings regarding quality of care and health outcomes drawn from a survey of client experience and from qualitative (site visit and interview) sources; and findings on the topics of workforce development, context, and sustainability, replicability, and scaling, all updated since NORC's Second Annual Report to CMMI.

Summative Findings (Outcomes)

For LCCI, there are statistically non-significent trends indicating reduced utilization, trends that reach statistical significance in the innovation's second year, relative to a comparison group comprised of similar patients (at Lifelong's FQHCs) who are not participating in the LCCI intervention. Cost claims data were not available.

In the section below, we present our analyses of program effectiveness, based on three types of data: Medi-Cal health plan claims from AAH, a patient survey, and narrative from NORC interviews and one site visit.

Core Measures

Our community (ambulatory care) analysis compares the experiences of LCCI enrollees with those of a matched group of comparators. It considers the impact on utilization (hospitalizations and ED visits) over one-year and two-year time periods after program enrollment. Our analysis is for California Medi-Cal beneficiaries, comprising 100 percent of all LCCI enrollees.[141]

Measures (per 1,000 beneficiaries unless noted)
- Hospitalizations
- ED Visits
- Hospitalizations within two years of program enrollment
- ED Visits within two years of program enrollment

Finder File and Creation of Analytic Sample. LifeLong provided a finder file that listed 225 unique program participants and enrollment dates, enabling us to use health plan data for these Medi-Cal beneficiaries to calculate outcome measures. AAH, LifeLong's health plan partner, provided a file of claims incurred by LCCI participants and comparators (LifeLong clients not enrolled in LCCI) for the time period January 1, 2010 through December 31, 2015.

Comparison Group. The comparison pool consists of approximately 10,000 patients who were not enrolled in LifeLong's LCCI program from FQHCs associated with LifeLong's program. We use propensity score matching with the claims received from AAH to create a comparison group for the LifeLong participants. First, we directly match participants with comparators based on gender and whether the participant had an ED visit in the year prior to LCCI enrollment. Next, we create propensity scores based on age, race, LifeLong clinic, Chronic Illness and Disability Payment System (CDPS) risk score, and an indicator for psychiatric diagnosis. Using matching with replacement, we then match each LCCI participant with one comparator (LifeLong client not enrolled in LCCI) with a similar propensity score.[142] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[143]

Descriptive Characteristics. Exhibit LCCI.2 displays the descriptive characteristics of beneficiaries in the LCCI program and comparison groups, with respect to demographics, comorbidities, and prior utilization.[144] Because we used matching with replacement in our propensity methods, there are fewer individuals in the comparison group than there are LCCI enrollees. LCCI enrollees are more likely to be of unknown race, have more hospitalizations and ED visits in the year prior to intervention, and have a higher CDPS risk score.

[141] Estimated percentage of Medicaid participants comes from awardee self-reported data. See Appendix C for more information on our analysis.

[142] Matching with replacement was conducted, to ensure an adequate number of similarly at-risk beneficiaries among the comparison group, given LifeLong's targeting of the highest-risk patients.

[143] For more information about our approach to propensity score matching, see Appendix C; for tests of common support and covariate balance, please see Appendix D.

[144] We test differences between these groups with a t-test for continuous measures (comorbidities and utilization before program enrollment) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, and coverage reason).

Exhibit LCCI.2: Descriptive Characteristics for LCCI and Comparison Group Beneficiaries

Variable	LifeLong	Comparison
Number of Patients	225	168
Gender % (N)		
Female	36.9 (83)	39.3% (66)
Age at Enrollment % (N)		
<30 years	2.2 (5)	1.8 (3)
30-39 years	6.2 (14)	5.4 (9)
40-49 years	10.7 (24)	13.7 (23)
50-59 years	31.6 (71)	33.3 (56)
60-69 years	33.8 (76)	35.7 (60)
70-79 years	10.7 (24)	8.9 (15)
80-89 years	4.9 (11)	1.2 (2)
Race/Ethnicity % (N) * **		
White	29.8 (67)	28.6 (48)
Black	46.2 (104)	48.2 (81)
Other	21.3 (48)	17.3 (29)
Unknown	2.7 (6)	6.0 (10)
Clinic % (N)		
Berkeley Primary Care	9.8 (22)	10.1 (17)
Over 60 Health Center	29.8 (67)	21.4 (36)
West Berkeley	37.3 (84)	38.1 (64)
Risk Score		
Mean CDPS Score (Standard Deviation)***	1.80 (1.54)	1.46 (1.45)
Mean Utilization in Year Prior to Program Enrollment		
Hospitalizations per patient (SD)***	0.3 (0.5)	0.2 (0.4)
ED Visits per patient (SD)*	0.6 (0.5)	0.5 (0.5)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of LCCI Program. Exhibit LCCI.3 displays adjusted difference in average outcome between LifeLong's treatment group and the comparison group *after* implementation of the intervention, minus the difference in average outcome between the treatment and comparators *before* implementation of the intervention. The DID model assesses the impact of the LCCI program at one and two years after program enrollment.[145] We find the following, relative to the comparison group:

- **Hospitalizations:** A significant decrease in hospitalizations (148 per 1,000 beneficiaries) two years after program enrollment. One year after program enrollment, we observe a non-significant reduction in hospitalizations.
- **ED Visits:** A significant decrease in ED visits (150 per 1,000 beneficiaries) two years after program enrollment.

[145] Adjustment factors include clinic, age at enrollment, gender, race/ethnicity, CDPS risk score, disability status, and psychiatric diagnosis.

Exhibit LCCI.3: Impact of LCCI Program on Outcomes

Outcome Measure (Number Per 1,000 Beneficiaries unless otherwise noted)	Adjusted Estimate [90% Confidence Interval]
1-Year Hospitalizations	-69 [-162, 24]
1-Year ED Visits	-26 [-135, 83]
2-Year Hospitalizations	**-148 [-244, -52]*** **
2-Year ED Visits	**-150 [-259, -41]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Quality of Care (Survey and Qualitative Findings)

NORC's evaluation uses survey and qualitative data from interviews and one site visit to assess LCCI's impact on quality of care, measured in terms of timeliness of services delivery, client experience, and the experience of informal (unpaid) family caregivers. NORC developed and administered a one-time telephone survey in consultation with LifeLong, between May and June 2015 for clients either currently active in LCCI or active at some point in the preceding 12 months. The survey was fielded in both English and Spanish, and had 73 respondents or proxy respondents out of an initial sample of 122 LCCI enrollees.[146] See Appendix F for the full set of survey findings.

Timeliness of Services Delivery. Enrollees credited LCCI with increasing access to care when needed (e.g., being able to reach either the NCM or PC); survey respondents noted that NCMs were especially helpful in obtaining referrals and accompanying enrollees to physician appointments. Focus group respondents echoed the survey findings, relating stories about how LCCI staff helped them address health (e.g., referral for specialty care or establishing a diagnosis) or social issues (e.g., housing).

Client Experience. Survey respondents and focus group members gave high marks to LCCI for patient satisfaction across innovation components. Survey findings show that 98 percent of enrollees were very satisfied or satisfied with the NCMs, 82 percent were very satisfied or satisfied with the PCs, and 86 percent were very satisfied or satisfied with the Living Well Workshops. Enrollees noted that they received excellent care, were able to work towards their goals, gained confidence and/or skills for self-care and advocacy, and described the sense of empowerment and support that they derived from participation. A subgroup of 12 disenrolled survey respondents gave a consistently positive assessment of LCCI's value. Their reasons for departure from the intervention related to scheduling conflicts, decisions not to pursue services, or geographic location; they praised the merits of LCCI in enabling greater access to care, listening to client problems and finding solutions, and teaching techniques that improve a client's quality of life.

Informal Caregiver Experience. Evidence is limited with regard to LCCI's impact on caregivers. One focus group respondent did note that the NCM made life easier, freeing up caregiving time previously devoted to obtaining referrals and following up on physician recommendations.

[146] See Appendix F for presentation of the survey results.

Health

Ninety percent of survey respondents credit their nurse care manager with helping them have more control over their health care and 61 percent say that the nurse care manager helps them go to the ED less often. Those who participated in peer coaching and/or attending Living Well Workshops were more likely to describe the nurse care manager as effective in these two ways, compared with those who participated only in clinic-based care management; these survey responses are corroborated by focus group findings, where participants who received both PC and NCM services were more likely to say that they had better health outcomes and were more empowered to take care of their health when compared to single intervention arm participants. In addition, eighty percent of survey respondents report that their nurse care manager has helped them avoid bigger problems with their health, and 82 percent say that their nurse care manager has helped them take better care of themselves.

Workforce Development

Staffing. The LCCI has two dedicated staff roles: (1) NCMs, who are RNs able to provide clinical services, reconcile medications, make home visits, and take on non-clinical tasks typically done by social workers (e.g., patient education, care coordination, and referrals); and (2) PCs, who support consumers as they define, set, and work towards self-determined goals. The premises of LCCI are that PCs are most effective when they work directly with the participant instead of the participant's caregiver or family, and that participants who can actively participate in goal-setting gain the most from the program. At the time of the program's closeout, LCCI employed four NCMs and two PCs. The roles of PCs have changed since program launch. As PCs have begun to facilitate Living Well workshops, CIL has offered the workshop more frequently and to an extended audience, namely to Spanish speakers.

> "[Working with a peer coach is] 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."
>
> --Nurse Care Manager, LCCI

While the intervention is a new collaboration between LifeLong and CIL and all staff have been new-hires, some worked previously either at LifeLong (NCMs) or CIL (PCs). LifeLong has reported difficulties in recruiting, hiring, and retaining staff. The complex medical and social needs of the target population require a specialized skill set, and LifeLong has stringent hiring criteria. It recruits PCs with experience in mentoring and clinical work, and NCMs who respect the independent living philosophy that guides CIL. To attract better qualified candidates, the awardee has provided flexible part-time work schedules. NCMs and PCs work as equal partners. Overall, they report working well with each other, and note that their collaboration has resulted in better outcomes for their patients, and professional growth for themselves.

Fully integrating the NCMs and PCs into the FQHCs has posed a constant challenge. The LifeLong FQHCs are busy health centers with competing needs and goals. While each FQHC provides physical space for NCMs and PCs (who work there one day a week), it has been challenging for the intervention team to integrate them into the clinic workflow. Because NCMs and PCs are funded by the LCCI grant, they cannot help the clinic staff with patients who are not enrolled in the program, which creates a divide between the FQHC staff and the LCCI interdisciplinary care team. In addition, clinic providers may not have time to work directly with NCMs, particularly as there is no reimbursement for such communications.

> "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 a clinical setting."
> --Nurse Care Manager, LCCI

Training. Both NCMs and PCs receive orientations to the LifeLong FQHC system and the CIL, as well as informal, experiential training by shadowing more experienced staff; however, the small number of staff and relatively high turnover rate made it difficult to standardize training or to organize shadowing. Newly hired NCMs may also receive training support via email when schedules preclude real-time shadowing. LifeLong provides training in other areas such as communication techniques, including a workshop led by the Aphasia Center, and a motivational interviewing training led by LifeLong's lead psychiatrist. NCMs identified a need for a more formal training approach to allow more systematic learning about their role and duties, and to enable a transfer of experience across their cohort. However, NCMs stated that they gained a greater understanding of the independent living philosophy from CIL training and by working with PCs, and that it has affected how they deliver care. By contrast, PCs reported positive experiences with their peer coach and Living Well facilitator training. They reported gaining skills such as communication techniques, knowledge of community resources, and ability to communicate and negotiate with clinicians. All reported feeling empowered by the training and noted that it increased their capacity to advocate for enrollees.

Implications for Workforce. Considering the external contextual factor of health care markets, the fee-for-service structure is not ideal for this model. Health plan reimbursement of PCs sets an important precedent for future capitated payer models to cover non-licensed staff. However, many aspects of their work still remain uncompensated, including training, patient recruitment, and team collaboration. Instability in health plan contracting can also destabilize innovation; when AAH went through receivership over the course of the grant period, reimbursement to LCCI was delayed. The culture of a prospective clinic site also plays an important role; clinic employees' understanding of LCCI roles and acceptance of the NCM and PC as part of clinic operations varied by location.

Context: LCCI In Its Third Year

As noted above, the local health care market, specifically for Medi-Cal health plans, has been crucial for the success of LCCI, together with the internal contextual factor of LifeLong's organizational culture and its robust relationships with its implementation partners, AAH and CIL.

External. The state of local health care markets has been a critical external contextual factor for LCCI. The innovation was designed with an eye toward integration with Cal MediConnect, California's financial alignment demonstration, which ultimately was not implemented in Alameda County. In addition, success has been tied closely to AAH. When AAH entered receivership and was delayed in paying bills, the ability of LCCI to operate was significantly challenged.

Internal. Some clinics were more open to the intervention than others. However, strong support from LifeLong leadership facilitated the continued implementation of the LCCI program. LifeLong continues to develop the social services it provides for the community, with the understanding that target populations are often dealing with homelessness, behavioral health, substance abuse, violence, and a host of other non-medical issues. As a result of working with LCCI, LifeLong clinics are adapting their EHR to be able to document these social issues and services.

Sustaining, Replicating, and Spreading Innovation

Sustainability. LCCI received a six month NCE; while the innovation stopped delivering services to clients at the end of June, the awardee leadership team has used the NCE support to collect and analyze related outcomes data, share findings, and further develop elements of the innovation that are being integrated into LifeLong clinic operations. These elements include new fields in the FQHCs' EHR, to document and enable billing for LCCI tasks (e.g., care coordination, referrals, and psychosocial notes relevant to independent living skills coaching and workshops), and future staffing plans to hire non-licensed peer counselors as clinic staff on a full-time or on-call basis, rather than part-time, to more fully integrate into clinic workflow and enable access to the EHR.

"All of these roles have never had a good place to document what they do and for us to assess the value of their work. With this EHR, now we can run reports on clinical outcomes based on interventions they have received. It will help us figure out which types of interventions work, and what to bring back or expand upon based on our HCIA work…The whole process of having the nurse care managers hone in on requirements helped us identify what we were weak on."

–Clinic Administrator, LCCI

"We are getting better about figuring out which services are better for which patients. There were some patients who expressed gratitude for the services but had no change in utilization. That is not cost efficient… We are very conscious that people in high-risk situations, that term get thrown around a lot, there is so much diversity in that group. Some people just need a place to live first. But it may be more efficient to have someone work on housing so that it's not the nurse doing that. LifeLong is involved in a lot of different efforts around frequent utilization work… We will end up in a structure where the doctor does not have to be the first step, other staff can be part of the first step…[do] not expect the provider staff to identify the social determinants of health-related issues, because that is not what they are best at."

–Clinic Administrator, LCCI

Replicability and Scaling. As we noted in NORC's Second Annual Report, both LifeLong and CIL see the potential to scale their program model through marketing of care management by RNs, peer counseling, and Living Well workshops, in order to bring client engagement around independent living skills to hospitals, managed care plans, clinics, and other providers delivering primary care for medically complex adults. This model would work best within a capitated payer environment.

Summary

We observe significant decreases in hospitalizations and ED visits two years after LCCI program enrollment, relative to a comparison group. One-year estimates for both hospitalizations and ED visits also show decreases, although these decreases are not significant. These results indicate that the LCCI program may be better positioned to affect longer-term outcomes for participants, as the program aims to stabilize this population by addressing housing and psychiatric issues before focusing on care.

Our analysis reflects limits related to the available data elements and the relatively small sample size. 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. We are also unable to capture social conditions in the claims, many of which can have great impacts on healthcare utilization. For instance, many LCCI enrollees experience homelessness or have unstable housing situations; while our

models would ideally include data on housing status, this information is not recorded in Medicaid claims and as a result unavailable to us for these analyses.

Over the three-year implementation period, FQHC LifeLong Medical Care collaborated with its LCCI implementation partners—CIL and AAH—to transform clinical workflow at three primary care sites for a small group of clients identified as high utilizers. LifeLong aligned medical care, care coordination, and patient engagement through independent living skills workshops and peer coaching. RN care managers at LifeLong joined expanded team models with CIL peer coaches. Intervention dosage varied from site to site, and from client to client at each site, as participants chose the extent of their involvement in care management, coaching, and attendance at workshops. LCCI received high marks for participant and caregiver satisfaction, especially in terms of greater access to care and feeling empowered. The awardee successfully addressed significant obstacles to implementation, related to staffing and communication across different organizations.

While LCCI is not being sustained as implemented under the HCIA funding period, significant operating changes at LifeLong reflect the influence of the HCIA pilot. LifeLong's EHR system has changed to document services that are not linked to a medical or behavioral health visit. In addition, LifeLong and CIL gained experience with the process of receiving reimbursement for peer coaching and Living Well workshops from health plans, in particular learning how to go through the prior authorization process and billing. More broadly, LifeLong took on culture change as an organization, to train and support staff in the philosophy and approaches of independent living and disability rights.

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Northland Healthcare Alliance

Northland Care Coordination for Seniors (NCCS). Based in rural North Dakota, this program operates in conjunction with the Program of All-Inclusive Care for the Elderly (PACE). At each of seven sites, a care coordinator provides monthly or as-needed home visits and telephone support to enable enrollees to age in place, guided by an interdisciplinary clinical team. The program includes chronic disease self-management education, individualized care plans, referrals to community resources, and minor home modifications.

PROGRAM MODELS: Care/Case Coordination, Caregiver Education and Support, Home Health/Home Care, Patient Navigation

LOCATION: North Dakota

GRANT: $2,726,216

AWARD DATES: 10/01/12 to 6/30/16

NO-COST EXTENSION: 12 month, full program

PAYER(S): Medicare, Medicaid

REACH: 913 beneficiaries (104.9% of target)[§]

POPULATIONS: Dually Eligible, Older Adults, Rural

DATA: Medicare claims (01/13-06/15); NORC consumer/caregiver survey (2015); site visits (2014, 2015); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- By hiring a marketing director, NCCS improved outreach to community organizations and recruitment of participants.
- Health IT transitioned from PACE CareOnline EHR to ATHENA, to house claims data, patient files, and assessments in one place, to expedite work of community care coordinators (CCCs) amd facilitate access to new care plan library.

WORKFORCE

- Despite difficulty hiring qualified care coordinators, turnover was low and job satisfaction high.
- All care coordinators completed chronic disease self-management (Kissito CP2) training.
- Licensed social workers were integral for connecting participants to resources, facilitating home modifications, and increasing enrollee and family engagement.
- A tiered system was developed for care coordinator staffing, assigning a CNA, LPN, or MA to conduct follow-up visits for lower-acuity patients.

CONTEXT

- Transportation was a concern for participants in this rural setting. Home visit care coordinators travelled long distances.

OUTCOMES[§§]

COST

- Findings not statistically significant

UTILIZATION

- Increase in emergency department visits (23 per 1,000 beneficiaries per quarter)

QUALITY

- 94% of survey respondents express high satisfaction with the program
- 77% of proxy respondents credit the NCCS program with helping them more easily coordinate the care of their family member (enrollee)
- 61% of proxy respondents find improved communication with their family member (enrollee) since enrollment
- 80% of respondents said that the NCCS care coordination improved their health

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

Northland pursued various sustainability options. The state Medicaid program certified Northland as a provider, and Northland is in discussion with the largest commercial payer in the state. For the short-term, the Otto Bremer Trust awarded Northland a grant to continue the program for one year. Pending analyses of potential cost savings will help to determine the long-term sustainability of NCCS.

REPLICABILITY & SCALING

Northland does not have replicability or scaling plans at this time. However, there may be opportunities to scale the program through a Medicare ACO.

[§]Target is for initial performance period, through 6/30/2015. [§§]Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the p<0.10 level. Outcomes for quality of care and health are from NORC consumer/caregiver survey.

Overview of Northland Care Coordination for Seniors

Background. Northland Healthcare Alliance's Care Coordination for Seniors (NCCS) program adapted the Program of All-Inclusive Care for the Elderly (PACE) model to coordinate care and foster patient self-advocacy for older adults living in rural North Dakota. The NCSS program provides chronic disease self-management education, develops individualized care plans, connects participants to community resources, and facilitates minor home modifications.

The NCCS program is available for both Medicare and Medicaid beneficiaries. Participants must be at least 55 years of age. They are also required to meet one or more of the following criteria: (1) have at least one chronic condition, (2) have had at least one non-elective hospitalization in the last year, (3) have had more than one fall in the past three months, or (4) need assistance with one or more activities of daily living (ADLs). Because NCCS does not require participants to meet any financial guidelines, it augments the PACE program, which is primarily targeted to dually eligible beneficiaries. Both PACE and community agencies refer patients to the program when they are not able to meet their needs.

Northland successfully implemented the NCCS program with the help of a strong workforce and ongoing outreach to coordinate with community organizations to leverage resources synergistically. Despite difficulties throughout the intervention in hiring new staff due to competition for jobs by the oil industry in North Dakota, over the second and third years of the program NCCS expanded its workforce to accommodate high enrollment across the seven sites (Linton, Bismarck/Mandan, Bowman, Ellendale, Dickinson, Hazen/Beulah/Center, Garrison). Staff turnover remained low over the course of the award period. Staff reported camaraderie and frequent communication among the team. Community health organizations, such as the Alzheimer's Association, referred individuals to NCCS when they were unable to provide the requisite services, such as conducting home visits and education on chronic condition self-management for residents desiring to remain in their homes.

Goals. NCCS partners with long-term care and assisted living facilities to expand the coordination of services to rural populations, in the hope of lowering costs, improving health care quality, and enhancing or maintaining the health of elderly participants living in the community.

Program Models. NCCS focuses primarily on in-home and telephonic care coordination by a community care coordinator (CCC), who is either a registered nurse (RN) or a licensed social worker (LSW). A major component of the program is the development of a care plan by an interdisciplinary care team (IDT). The team may include RNs, social workers, physicians, pharmacists, dieticians, or other providers, depending on participants' needs and goals. The NCCS comprehensive approach to care coordination includes medication reconciliation post-discharge; patient engagement and empowerment; care coordination and reminders to patients; connections with non-medical services, such as landscaping, snow removal, assistance moving, and food services (e.g., Meals on Wheels); caregiver supports; and facilitating targeted support to help participants remain in their homes and live independently (e.g., installation of grab bars, bed rails, shower seats, special phones (e.g., amplifiers and large dial pads).

At the height of implementation, each CCC worked with approximately 60 participants and had varying levels of contact with each participant, depending on the assistance needed. At a minimum, CCCs checked in monthly with each participant, either through a home visit or by telephone. For example,

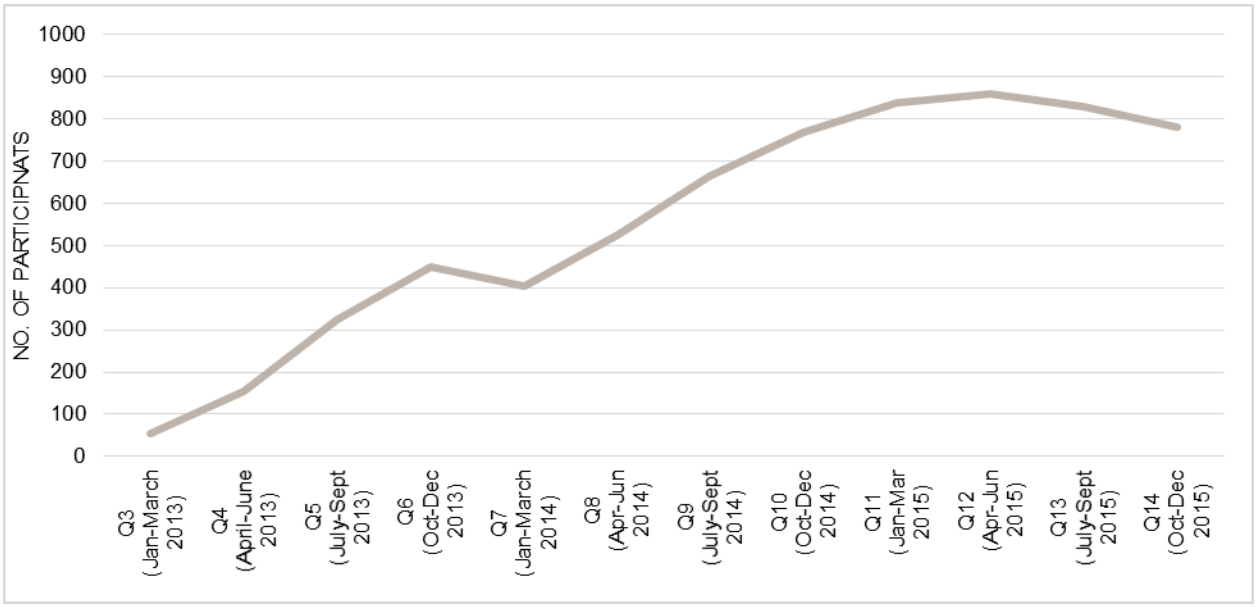
CCCs may have visited some participants more frequently when they first enrolled in the program. Toward the close of the award period, NCCS had fewer staff members, and CCCs were primarily following up with participants by telephone.

Implementation Updates. While CCCs were originally responsible for enrollment, Northland hired a marketing director after the first year to focus on enrollment and outreach. She became the face of the program, working with organizations and talking to the community about care coordination. The goal of this strategy was fostering partnerships with community organizations, so that they could refer individuals to NCCS. Referrals became a major source of enrollment.

In the third year of the program, Northland transitioned from PACE CareOnline EHR to ATHENA, which houses claims data, patient files, and assessments all in one place. The awardee expected that housing all patient documents in one location would expedite the CCCs' work. It developed a care plan library to help CCCs develop care plans with more consistent and measurable goals. This library will be integrated into the EHR. In addition, staff received access and training on the North Dakota State Health Information Network (ND HIN) to access EHRs and health outcome data.

Reach and Demographic Profile of Enrolled Beneficiaries. 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 indirect participants (those 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. As of December 31, 2015, NCCS had served a cumulative total of 913 unique participants since program launch, 105 percent of the total number projected to be served over the three years of the HCIA-funded program (870 participants). The intervention stopped enrolling new participants in July 2015 due to limited staffing.

Exhibit NHA.1: Total Number of NCCS Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

In the section below, we present our analysis of program effectiveness, based on Medicare Fee-For-Service (FFS) claims, Northland's internal survey of participants, in-person and telephone interviews with NCSS staff, and focus groups with program participants and informal caregivers.[147]

Core and Supplemental Measures

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department (ED) Visits
- 30-day Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Our community (ambulatory care) analysis compares the experiences of NCCS enrollees with those of a matched comparison group. It considers the impact of the awardee's NCCS program on utilization, cost, and quality of care over the implementation period as a whole and in each quarter of enrollment.[148] Our analysis is limited to Medicare FFS beneficiaries, who comprise 85 percent of all NCCS participants.[149]

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.[150] We identified 731 unique beneficiaries, and further limited this number by enrollment data and Medicare identifiers, to yield an analytic sample of 562 beneficiaries.

Comparison Group. The comparison pool consists of non-institutionalized Medicare FFS patients in the same zip codes in North Dakota as NCCS program participants. We use propensity score matching with replacement to find appropriate comparators.[151] The final propensity score model includes age, race, gender, dual eligibility status, HCC score, and prior-year utilization (ED visits and hospitalizations) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[152]

Descriptive Characteristics. Exhibit NHA.2 displays the descriptive characteristics of beneficiaries for the treatment and comparison groups, with respect to demographics, comorbidities, and prior utilization.[153] Beneficiaries attributed to the NCCS program are more likely to be female. We find small but significant differences in HCC scores. There are no significant differences on total Medicare costs or utilization in the year before program enrollment relative to the comparison group.

[147] NORC received Medicaid data for about 100 participants, but we determined the quality of the data was not sufficient for inclusion in this report.

[148] The analysis focuses on beneficiaries participating in the NCCS program between January 31, 2013, and December 21, 2015.

[149] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[150] The analysis presented includes Medicare claims through March 31, 2016, for this report. We use a claims run-off date of December 31, 2015.

[151] For more information on propensity score matching, please refer to Appendix C.

[152] For more detailed information on tests of common support and covariate balance, please refer to Appendix D.

[153] We test differences between the groups with a t-test for continuous measures (comorbidities, risk score, and utilization before enrollment) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, and coverage reason).

Exhibit NHA.2: Descriptive Characteristics for NCCS and Comparison Group Beneficiaries

Variable	Northland	Comparison
Number of Persons	562	535§
Mean Number of Quarters Enrolled [Range]	5.2 [1-10]	5.4 [1-10]
Gender % (N)*		
Female	63.3 (356)	58.3 (312)
Age Group % (N)		
<55 years	0.5 (3)	0.7 (4)
55-64 years	4.8 (27)	5.6 (30)
65-74 years	20.8 (117)	19.4 (104)
75-84 years	38.8 (218)	40.9 (219)
≥85 years	35.1 (197)	33.3 (178)
Race/Ethnicity % (N)		
White	97.5 (548)	97.8 (523)
Other	2.5 (14)	2.2 (12)
Dual Eligibility % (N)		
Dually Enrolled	12.1 (68)	12.0 (64)
Coverage Reason % (N)		
Age	82.6 (464)	86.9 (465)
Disability	17.1 (96)	12.3 (66)
End-Stage Renal Disease (ESRD)	0.2 (1)	0.2 (1)
Disability & ESRD	0.2 (1)	0.6 (3)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)**	1.9 (1.3)	1.7 (1.2)
Mean Count of HCCs (SD)*	2.8 (2.5)	2.6 (2.3)
Chronic Illness and Disability Payment System (CDPS)		
CDPS Risk Score (SD)	2.0 (1.4)	2.0 (1.4)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD)	$17,464 ($24,899)	$16,306 ($23,076)
Hospitalizations (SD)	578 (899)	551 (859)
ED Visits (SD)	1,112 (1,926)	1,056 (1,978)

NOTE: *p<0.10, **p<0.05, ***p<0.01. §The number of comparators is less than the number of treatment group members, which reflects the use of Mahanoblis matching with replacement; please see Appendix C for more information.

Impact of NCCS Program. Exhibit NHA.3 presents the average quarterly and aggregate impact of the intervention of the NCCS innovation on its participants relative to the comparison group.[154] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[155] We find the following, relative to the comparison group:

- **Cost:** A non-significant increase in total quarterly cost of care.
- **Utilization Measures:** A non-significant increase in hospitalizations, a significant increase in ED visits of 23 per 1,000 beneficiaries per quarter, and a non-significant decrease in 30-day readmissions.
- **Quality of Care:** A non-significant increase in ACS hospitalizations.

[154] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, dual eligibility indicator, HCC score, and disability indicator.

[155] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit NHA.3: Impact of NCCS Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (Per 1,000 beneficiaries unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary ($)	$148 [-$365; $661]
Hospitalizations	6 [-12, 24]
ED Visits	**23 [0, 46]***
30-Day Readmissions	-8 [-64, 48]
ACS Hospitalizations	11 [-5, 27]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$433,853 [-$1,072,033; $1,939,739]
Hospitalizations	18 [-35, 71]
ED Visits	**68 [0, 136]***
30-Day Readmissions	-2 [-20,16]
ACS Hospitalizations	32 [-14, 78]

NOTE: *p<0.10, **p<0.05, ***p<0.01. §: Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program implementation.§§: Aggregate Impact is estimated for this awardee based on the total number of program participants (562) with an average length of program enrollment of 5.2 quarters.

Quarterly Fixed Effects Analysis of NCCS Program: Findings from a quarterly fixed effects (QFE) DID model are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Quality of Care (Survey and Qualitative Findings)

We base our assessment of NCSS's impact on quality of care on a survey of, and focus groups with, participants and caregivers.[156] Below we present an overview of participants' overall satisfaction with, and perception of, the NCCS program. We then look more closely at participant experience with NCCS as it relates to access to health care and human services, support for goals, and participant autonomy and self-management. Unless otherwise noted, the discussion in this report is based on the survey responses of enrolled participants (N=294), approximately 30 percent of enrolled participants; see Appendix F for the full set of survey findings. Although most respondents are older adults (≥75 years), less than a quarter report difficulty dressing/bathing (22 percent). Thirty-six percent report cognitive impairments (difficulty remembering or making decisions). The most commonly reported limitation is difficulty walking or climbing stairs (57 percent).

Timeliness of Services Delivery. Nearly all respondents (93 percent) report having access to their CCC when needed. Mirroring positive feedback in other survey domains, most respondents agree or strongly agree that their CCC helps to manage different aspects of their care, including connecting them to needed services, which might include medical alert systems, social services or financial resources for medications (90 percent), and providing assistance in getting referrals to various health care providers (79 percent). Fewer respondents report receiving assistance from their CCC with coordinating with doctors/hospital on

[156] NORC's Second Annual Report provides a detailed description on the survey instrument and administration, and a demographic profile of survey respondents.

discharge plans (27 percent), planning meals (through agencies such as Meals on Wheels; 31 percent), and scheduling appointments and reminders (38 percent).

Qualitative findings support these survey findings. For example, some participants explained during interviews that CCCs arranged to have walk-in tubs installed in their homes, and helped find funding to cover part of the cost. This modification allowed them to remain safely in their homes and extended the time they could conduct activities of daily living (ADLs) on their own. One patient noted that without this tub, she would have needed a personal care attendant to come into her home to help her with bathing.

Patient Satisfaction. Almost all respondents (94 percent) report they are very satisfied or satisfied with NCCS. Likewise, 80 percent of respondents said that the NCSS care coordination improved (66 percent) or partially improved (15 percent) their health. Of those who receive help managing their health from a family member or friend (67 percent), 83 percent credit the program with improving communication with their caregiver. Not only are respondents satisfied with the program and confident in the care they receive, they also report high levels of involvement in managing their health. Overwhelmingly, respondents report being actively involved in planning their own care (96 percent), with 88 percent attributing some of this self-management to NCCS. We find a similar distribution in the number of respondents reporting that they have the information needed to make decisions about their care (95 percent).

- **Goal Setting and Attainment.** Goal setting and attainment comprises another key aspect of the Northland intervention. Given the overall high levels of satisfaction and positive feedback, the frequency of reported goal setting is relatively modest. Only about one-third of respondents (33 percent) set one or more specific goals to manage their health, though the low frequency may be due to question wording and respondents' uncertainty about the meaning of "goal setting."[157] Of those who report setting one or more goals, most (89 percent) also report ongoing work to reach these goals and agree (59 percent) or strongly agree (28 percent) they are making progress towards goal attainment. Open-ended responses regarding goal setting show most respondents focused on a physical health goal, such as exercising more.

> "This program turned our lives around and gave my mother's life back. She can have a life with others and not just me. Her health has improved and her outlook on life has improved. I cannot express how it makes me feel, I am so happy for her to have friends, be healthy and to live and enjoy life."
> –Family Member, Northland Enrollee

- **Willingness to Pay.** Currently, there are no fees associated with participating in NCCS. The survey asked respondents about the maximum monthly amount they would be willing to pay for the program, in an effort to gauge prospects for sustainability if fees were implemented. A majority of respondents would pay some amount to participate in the program. Only 33 percent of respondents would not participate in the program if there were costs associated with it.
- **Care Coordination.** The survey asked participants about their experiences and relationship with their CCC, an integral component of the NCCS program. Respondents generally describe supportive relationships and patient-centered communication. Almost all (96 percent) report a good working relationship with their CCC and respond positively (agree or strongly agree) when asked to value various aspects of care coordination engagement. These positive judgments and

[157] Question text: *"Did you set one or more specific goals with [your Care Coordinator/CCNAME] to manage your health? You might have written your goals down on a form called, "Managing My Health.""*

perceptions of their CCC are consistent with the overall high level of program satisfaction. While most respondents did not have suggestions for improving care coordination when asked, the most common suggestion among those who answered, in open-ended responses, was more frequent visits and check-ins.

- **Relationship with Providers.** The survey asked participants about their relationship with providers, which can include doctors, nurse practitioners, or physician assistants. A majority (74 percent) report improved communication with their providers since enrolling in the NCCS program. This improvement may help participants better understand their health care needs, and support the high levels of involvement and control in health management reported in the survey.
- **ED Utilization.** When asked if their ED visits increased, decreased, or stayed the same since enrollment in NCCS, 26 percent report visiting about the same amount as prior to enrolling, 21 percent report a decrease in visits and nearly half (46 percent) respond that the question was not applicable (e.g., respondents did not go to the emergency room. These findings are consistent with findings from claims data. Responses to ED utilization questions may be affected by the length of time a respondent has been enrolled in NCCS, making it difficult to gauge a change in utilization or attribute it to the program in some way. A review of open-ended responses capturing reasons for a decrease in ED visits show many respondents report feeling better and taking better care of themselves. For the small number reporting an increase in ED visits, open-ended responses describe acute issues such as the possibility of having a stroke or pneumonia.

Informal Caregiver Experience. Proxy respondents (a family member or informal caregiver) were encouraged to help NCCS participants who were unable to complete the survey on their own, or complete the survey on the participant's behalf (n=31). Proxy respondents completed the same survey as participants, with an additional set of questions. Most were either a spouse or child of the NCCS participant (48 and 39 percent, respectively), living in the same household as the participant (61 percent), and providing care to the participant for two years or longer (81 percent).

"Since I live [out-of-state], I try to see my dad every few months. I'm very relieved to know there is someone I can call. I have called a few times to get [the care coordinator's] opinion or to have her check on dad when I was concerned. It's quite beneficial to have eyes and ears on the ground there. I'm trying to get myself to North Dakota permanently so I can be close by. In the interim, it's incredibly helpful to know there is someone to be those eyes and ears."
–Family Member, Northland Enrollee

On average, proxy respondents report spending 52 hours per week providing care. The survey asked informal caregivers to assess whether NCCS affected communication, care coordination, and the stress and strain that may come from caring for the NCCS participant. A majority (77 percent) attributes the NCCS program with helping them more easily coordinate the care of the participant. Family members interviewed note that they trust the CCC to identify resources to assist their parents, and to identify situations that require medical attention before the situation escalates to ED or hospitalization. Sixty-one percent of respondents strongly agree (16 percent) or agree (45 percent) that communication with the NCCS participant improved since enrollment. When interviewed, several family members who lived out of state noted they were unaware of how unsafe their parent was in the home until CCC notified them. Most respondents report that levels of physical strain, emotional stress, and financial hardship remained the same since enrolling: 52 percent report the same level of physical strain, 42 percent report the same level of emotional stress, and 77 percent report the same level of financial hardship. The least amount of reported change was in levels of financial hardship, with only 16 percent of respondents reporting an increase or

decrease. The biggest change was reported in emotional stress levels, with 32 percent of respondents reporting less stress and 19 percent reporting more stress since enrollment. Focus group findings support this—children of program participants report that they were burnt out from taking care of their parents before care coordination. One family member indicates the CCC gave her "peace of mind."

Workforce Development

Staffing. As mentioned earlier, Northland struggled with hiring staff over the entire course of the award, due to both a shortage of medical professionals in the rural areas it serves and competition for jobs from the oil industry. Given the rural locations of many participants, some CCCs had to drive great distances to visit participants. This "windshield time" limited the number of visits the CCC could make. Despite challenges in hiring an adequate number of staff, turnover was low for the duration of the program, with staff reporting high morale, high levels of job satisfaction, and camaraderie. One staff member commented, "This was the best job I ever had." Another said, "We fall in love with our participants. They become like our grandparents." CCCs did have to navigate boundary issues, minimizing contact on evenings and weekends in order to both empower patients and to maintain their own energy and mental capacity. This was particularly challenging in cases where CCCs knew their participants personally outside of their role in NCSS, given the rural location (e.g., a daughter-in-law was one participant's CCC).

During the no-cost extension (NCE) period, with the future of the program uncertain, several staff members did leave.

> "Having the LSW was a huge part of our program and the reason that some people referred to our program to handle the social issues."
>
> –Program staff

Over the course of the award period, Northland made several changes to the original staffing model. First, it introduced LSWs to the care coordination team. Program staff reported that social workers were integral to the team, particularly for connecting participants to community resources, facilitating home modifications, and increasing participant and family engagement; they found having one of these staff in each region crucial. Another change was the development of a tiered system for CCC staffing, assigning a certified nursing assistant (CNA), licensed practical nurse (LPN), or medical assistant (MA) to conduct follow-up visits for lower-acuity patients, and an RN or LSW for higher-acuity patients. Either an RN or LSW continued to conduct the initial home visit and assessments for all participants.

Implications for Workforce. The shift to a tiered system for CCC staffing essentially created a new workforce model, which allowed for broader staff recruitment, increased capacity, and reduced implementation cost. With respect to staffing, program leadership found that the most important qualification was finding a person who was the right fit.

Context: NCCS in its Third Year

Though it took time, Northland built strong relationships with community organizations, which was essential for both recruiting and fully serving participants. Building these relationships required a dedicated staff member. Northland found it was able to make the most headway after hiring a marketing coordinator; CCCs did not have the time to build relationships in the community in addition to their other

responsibilities. Once they understood the value of the program, community organizations became collaborative partners, participating in interdisciplinary staff meetings and working with NCSS staff to meet participants' needs.

The goal of enabling frail older adults to remain in their homes particularly resonates in rural North Dakota, where the population greatly values independence. Participants highly value care coordination for providing the necessary resources to remain safely in the community. The rural setting raised several challenges, including a lack of community resources in close proximity, and long travel times for CCCs—especially among those who worked in multiple counties, who were limited in the number of participants they could visit on a given day. In addition, assisting rural participants' access to transportation to health care appointments given the lack of public transportation options was challenging. While rural patients may rely upon family and friends for transportation, the transportation provider must take time off work to accommodate health care appointments. Most specialty providers are located miles from rural communities. While telemedicine can bridge some of these distances, telemedicine consults may not be available due to a number of issues, including specialists who are not willing to provide distant consultations; originator site (in most cases a rural health clinic) not having the resources; and limited reimbursement for the originator site.

Sustaining, Replicating, and Spreading Innovation

Sustainability. Northland's Innovation Award continued through June 2016, during which time it sustained the intervention. In the last year of the program, however, NCSS began to lose staff due to concerns about sustainability. Due to staff retention issues, it stopped recruiting additional participants in July 2015.

Northland has several potential avenues for sustainability following the completion of the award. Northland is certified as a Medicaid provider, which would allow it to bill for the CCCs' services; however, a very small percentage of NCSS participants are Medicaid only (i.e., meaning they are not dually eligible or covered under ACA expansion). They are currently in discussion with the largest payer in the state [ND BCBS] regarding providing care coordination for their members. In the short-term, the Otto Bremer Trust[158] awarded Northland a grant to continue the program for one year. It is also working with community partners on an application for the CMS Accountable Health Communities model.

Replicability and Scaling. While there are no plans for scaling at this time, there are opportunities to scale the program in North Dakota Medicare ACO or Medicaid that includes dually eligible beneficiaries and those covered under Medicaid expansion. With some modifications to the assessment protocol, this model could potentially be adapted for use with different populations (e.g., pediatric, special needs) as part of a clinically integrated network.

Summary

Northland's care coordination program aimed to enable older adults who have been recently hospitalized to remain in their home. CCCs and social workers provided education for chronic disease self-

[158] https://www.ottobremer.org/sites/default/files/news-releases/OBT_NR_20160310.pdf.

management, conducted medication reconciliation, connected patients to non-medical services, facilitated improvements to the home environment to support independent living, and provided support for family members. Quantitatively, we found no significant decreases in outcomes or cost among Medicare NCCS participants. However, qualitative and survey findings that the NCCS program improved participants' communication with their primary care providers, helped participants access services to enable them to age in place, helped informal caregivers more easily coordinate the participant's care, and improved communication between participants and their family members. As is often the case with care coordination programs, participants would have liked more frequent visits or check-ins. CCCs had to navigate boundary issues, minimizing contact on evenings and weekends to both empower patients and maintain their own energy levels.

Northland made several changes to the workforce model over the course of the intervention. It found that including LSWs on the care coordination team was one of the biggest improvements made over the course of the intervention. Social workers were integral for connecting participants to community resources and facilitating home modifications. It also moved to two levels of CCCs, utilizing CNAs, LPNs, or MAs to conduct follow-up visits for lower-risk participants. This essentially created a new workforce model, which allowed for broader staff recruitment, increased capacity, and reduced cost.

References

HCIA Narrative Progress Report for Northland Healthcare Alliance, for Reporting Quarter End Date 9/30/2015. Submitted by Northland, 10/31/2015.

HCIA Quarterly Report for Northland, for Reporting Quarter End Date 9/30/2015. Submitted by Northland, 12/09/2015.

Palliative Care Consultants of Santa Barbara

Doctors Assisting Seniors at Home (DASH). DASH offers an alternative to seeking urgent care at a hospital emergency department (ED) for Medicare beneficiaries age 60 and older who are considered frail, would like to remain at home, and live within a 12-mile radius of Santa Barbara, California. Once a beneficiary enrolls, DASH may be called to respond with home-based assessment, treatment, and care coordination by registered nurses, nurse practitioners, or physicians with experience in primary care, urgent care, and palliative medicine.

PROGRAM MODELS: Advance Care Planning, Care/Case Coordination, ED Diversion, Home Health/Home Care, Patient Navigation

LOCATION: Santa Barbara, CA

GRANT: $4,254,615

AWARD DATES: 12/13/12 to 6/30/16

NO-COST EXTENSION: 12 month, full program

PAYER(S): Medicare, Medicaid

REACH: 1,658 beneficiaries (95% of target)

POPULATIONS: Disability, Dually Eligible, Older Adults,

DATA: Medicare claims (2013-2015); NORC consumer/caregiver survey; one site visit (2014); telephone interviews with leadership (2014-2016)

IMPLEMENTATION

- Shifted triage structure with RNs or office staff assigning visits to clinical field staff to better handle call volume and accommodate practice growth.
- Overtime, increased use of NPs and MDs.
- Developed relationships with community PCPs to strengthen emphasis on advance care planning and care coordination and with community organizations to increase outreach and recruit program participants.

WORKFORCE

- Small, close-knit team affiliated with an independent provider practice.
- Experienced RNs and NPs most successful in the program with a combination of clinical and community experience.
- Experiential training and low staff turnover.

CONTEXT

- Lack of risk-based contracting in local health care market limits ability to sustain.
- Limited data sharing with local hospital system was due to internal hospital changes

OUTCOMES§

COST

- No findings reach statistical significance

UTILIZATION

- Decrease in hospitalizations (-17 per 1,000 beneficiaries per quarter)
- Decrease in ED visits (-24 per 1,000 beneficiaries per quarter)

QUALITY

- 98 percent of survey respondents say that they can access DASH services quickly if needed
- 94 percent are satisfied or very satisfied with DASH
- 77 percent of proxy respondents indicate that DASH enables them to more easily coordinate care for their family member (enrollee)

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

PCCSB plans to sustain DASH by means of monthly fees, patient co-pays and payer contributions. In the long-term, the awardee expects that local risk-bearing entities (e.g., Medicare or Medicaid ACO) will underwrite program costs.

REPLICABILITY & SCALING

PCCSB is a local intervention in the Santa Barbara community. There are no plans to scale this program to other locations.

§Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the P<0.10 level. Outcomes for quality of care and health are from NORC consumer/caregiver survey and focus groups.

Overview of the DASH Program

Background. Palliative Care Consultants of Santa Barbara (PCCSB) is a four-physician outpatient practice with long-time connections to the area. PCCSB created the Doctors Assisting Seniors at Home (DASH) program, a new model inspired by emergency department (ED) diversion programs and preventive home visits, in collaboration with a local advocate who promotes advance care planning. Santa Barbara has a sizable community of retirees, many of whom have limited incomes, and a small, somewhat isolated health care system—one hospital system, one affiliated multispecialty physician practice, and little in the way of capitated or risk-bearing reimbursement for care. While DASH markets itself as offering care coordination and patient navigation, it also offers ready access to clinical expertise that in some cases functions as de facto primary or palliative care for participants.

Goals. Although PCCSB shares the CMMI core metrics of reducing utilization and Medicare costs for enrolled beneficiaries, the awardee has also identified objectives that are more clearly tied to improvements in the quality of care of its target group. These include increasing the percentage of persons with completed advance care plans and delaying entry to skilled nursing facilities by extending the time in which older adults can live safely at home.

Program Models. The awardee has created a new model to divert beneficiaries from visiting the hospital ED for urgent care, offering enrollees the chance to call the DASH program rather than 911 to request phone and/or home-based assessment and treatment. In addition, the DASH model uses the enrollment process to offer advance care planning; care coordination (e.g., confirmation of a primary care provider); patient navigation; and referrals to community benefits and social supports (e.g., Meals on Wheels, transportation). Services delivery is episodic, occurring in response to an enrollee or caregiver's call; at an assessment visit, DASH staff may revisit tasks begun during enrollment.

Implementation Updates. NORC's Second Annual Report (2016) includes HCIA awardee self-reported data through March 31, 2015, as well as data gathered by NORC through July 1, 2015. PCCSB continued to generate self-reported data for the final 90 days of the initial period of performance (April 1 through June 30, 2015) and into its no-cost extension year, scheduled to be completed on June 30, 2016. Key developments related to implementation since the preparation of NORC's Second Annual Report include the following:

- **Staffing and Timing of Rapid Response Model.** Triage has become more challenging, with greater numbers of enrollee calls and higher patient acuity. In response, PCCSB created an assessment system where all calls are answered in the program office by a medical assistant or nurse, who in turn dispatches a clinician (nurse, nurse practitioner, or physician) matched to the anticipated need of the caller. The time window for a rapid response has been extended.

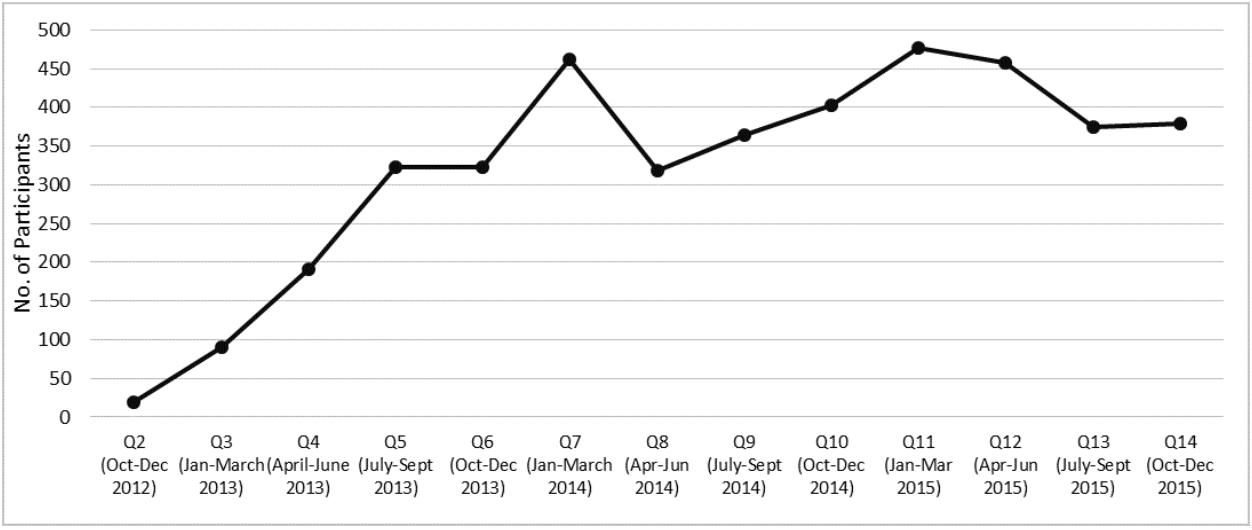
> "We don't have tremendous numbers of referrals that are initiated by the physicians themselves. We have a lot where the patient gets their physician to endorse the program. I think the majority of our referrals, we have multiple touch points with people. Over the long-term, that is what translates into people signing up for the program."
>
> --Provider

- **Physician Orders for Life-Sustaining Treatment (POLST) Completion.** The awardee has developed strategies to encourage primary care providers to sign an enrollee's POLST; DASH leaders estimate that primary care providers sign about 90 percent of POLSTs as of spring 2016. DASH clinicians sign the POLST for the remaining 10 percent.

- **Outreach Strategies.** Recruitment has posed a challenge throughout implementation. PCCSB has developed referral partnerships with staff at senior buildings, a continuing care retirement community, adult day programs, churches, and other local institutions; hosted community meetings; retained a consultant to design targeted marketing (e.g., television and radio ads, web); and in 2015 began receiving greater numbers of direct referrals from providers (hospital discharge and transition staff) and primary care physicans. The DASH program has learned to frame its message in terms of offering greater security, akin to insurance, rather than to market its services as appropriate for frail elders; prospective enrollees may not see themselves as vulnerable enough to need the service.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from PCCSB provide participation by HCIA reporting quarter, as seen in Exhibit PCCSB.1. There has been a general increase over time, with a sharp uptick around Q7, a decline the following quarter (Q8), and a peak around Q11. During the most recent quarter for which data are available (October 1 through December 31, 2015), the awardee reports serving 379 beneficiaries. For the group of beneficiaries participating in DASH during the period from October 1 through December 31, 2015, most enrollees are age 75 and older (79 percent), with 17 percent ages 65 to 74 years and four percent ages 26 to 64 years. Most enrollees are female (72 percent). Nearly all are White (88 percent), and 10 percent are identified as Hispanic or Latino.

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



In this chapter, we present our summative findings for program effectiveness (outcomes), based on analysis of Medicare claims; findings regarding quality of care drawn from consumer survey data and qualitative (site visit and interview) sources; and findings on the topics of workforce development, context, and sustainability, replicability, and scaling, all updated since NORC's Second Annual Report (2016).

Summative Findings (Outcomes)

Project DASH reduces hospitalizations and ED use but does not change total cost of care. Similar to the awardee's own survey results, we find DASH consumers to be very satisfied with the HCIA-funded innovation and many of its features. Respondents say that the goals they set at enrollment are supported and that their choices about their health care are taken into account by DASH staff. Enrollees say that they are able to access DASH services quickly, either on the phone or in-home, and most report that DASH moves at the right pace. The program has a positive influence on informal family caregivers, with many describing lowered stress levels since their family member enrolled in DASH. Respondents took advantage of open-ended questions to share their satisfaction with the DASH concept, services, and staff. While many patients might wish to see DASH service hours extended, most enrollees who pay a monthly fee for DASH agree that the current program is a good value.

Core and Supplemental Measures

Our community (ambulatory care) analysis compares the experiences of DASH enrollees with a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's DASH program over the implementation period as a whole and in each quarter of program implementation. Our analysis is for Medicare FFS beneficiaries, comprising 73 percent of Medicare DASH enrollees.[159]

Measures (per 1,000 beneficiaries unless noted)
- Total Medicare Cost of Care per Quarter
- All-cause Hospitalizations
- Emergency Department (ED) Visits
- 30-day Readmissions
- Ambulatory Care Sensitive (ACS) Hospitalizations

Finder File and Creation of Analytic Sample. PCCSB provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[160] We identified 1,338 unique beneficiaries, and further limited these by enrollment date, Medicare identifiers, admission date, and discharge date, yielding a final analytic sample of 1,112 individuals.[161]

Comparison Group. We use Medicare claims to create an external comparison group comprising non-institutionalized Medicare FFS beneficiaries living in nearby locations (Ventura County). We identify comparison group participants as those living in nearby locations in calendar year 2013 who are demographically similar and have comparable prior year utilization, with one or more chronic conditions as defined by the hierarchical condition category (HCC) risk score. We use propensity score matching to

[159] There are 1,112 of 1,522 enrollees in the match rate table, although the analytic file sent to NORC did not contain all of these enrollees. See Appendix C for more about our analytic approach.

[160] Medicare claims are available through March 31, 2016, for the analysis in this report. We used December 31, 2015, as the cut-off date to account for the 90-day claims runoff.

[161] The analytic file uses a sample of 1,112 program enrollees with Medicare FFS as their payer. This represents less than two-thirds of all program participants, and it is unlikely that the Medicare FFS subpopulation is a representative sample of the whole participant population. The comparison population consists of 1,112 Medicare FFS enrollees matched without replacement by nearest neighbor from a pool of 66,318. It is possible that alternative matching schema could change the composition of the set of comparators and produce different results.

minimize observed differences in beneficiary characteristics between the treatment and comparison groups. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[162]

Descriptive Characteristics. Exhibit PCCSB.2 displays the descriptive characteristics of beneficiaries for the treatment and comparison groups.[163] We compare the two groups with respect to demographics, comorbidities, and prior utilization.[164] We find no significant differences in age, gender, race/ethnicity, or risk scores, but PCCSB enrollees visited an ED significantly more often during the year prior to enrollment.

Exhibit PCCSB.2: Descriptive Characteristics for DASH and Comparison Group Beneficiaries

Variable	PCCSB	Comparison
Number of Beneficiaries	1,112	1,112
Mean Number of Quarters Enrolled [Range]	5.5 [1-13]	4.8 [1-13]
Gender % (N)		
Female	66.4 (738)	66.4 (738)
Age Group % (N)		
< 70 years	13.7 (152)	10.9 (121)
70-79 years	28.1 (313)	29.6 (329)
80-89 years	39.5 (439)	38.8 (431)
90+ years	18.7 (208)	20.8 (231)
Race/Ethnicity % (N		
White	90.1 (1002)	89.7 (998)
Black	2.0 (22)	0.5 (6)
Other	7.9 (88)	9.7 (108)
Dual Eligibility % (N)		
Dually Eligible	29.6 (329)	28.3 (315)
Coverage Reason % (N)		
Age	85.2 (947)	86.4 (961)
Disability	14.7 (164)	13.0 (145)
ESRD	0.0 (0)	0.3 (3)
Disability & ESRD	0.1 (1)	0.3 (3)
Hierarchical Chronic Conditions (HCC) Risk Score		
Mean HCC Score (Standard Deviation)	1.7 (1.2)	1.6 (1.3)
Mean Count of HCCs (SD)	2.3 (2.3)	2.3 (2.5)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost of Care per Beneficiary, in $ (SD)	$16,563 ($25,322)	$16,777 ($28,590)
Hospitalizations (SD)	462.2 (918.1)	482.9 (955.2)
ED Visits (SD)**	935.3 (1705.4)	723.9 (1143.3)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

[162] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[163] Descriptive statistics are based on findings prior to propensity score matching.

[164] We tested differences between the groups with a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical parameters (age, race/ethnicity, dual eligibility, and coverage reason).

Impact of DASH Program. Exhibit PCCSB.2 presents the average quarterly and aggregate impact of the DASH program on its participants relative to the comparison group. Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[165] We find the following, relative to the comparison group:

- **Cost:** A non-significant *decrease* in total cost of care.
- **Utilization Measures:** *Decreases* in all-cause hospitalizations (-17 per 1,000 beneficiaries) and ED visits (-24 per 1,000 beneficiaries), and a non-significant dencrease in 30-day readmissions.
- **Quality of Care Measures:** A non-significant *decrease* in ACS hospitalizations.

Exhibit PCCSB.3: Impact of DASH on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	-$316 [-$745, $113]
All-Cause Hospitalizations	**-17 [-25, -9]** ***
ED Visits	**-24 [-36, -12]** ***
30-Day Readmissions	-5 [-40, 30]
ACS Hospitalizations	-2 [-7, 3]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Medicare Cost of Care ($)	-$1,920,663 [-$4,529,883; $688,557]
All-Cause Hospitalizations	**-103 [-153, -52]** ***
ED Visits	**-149 [-222, -76]** ***
30-Day Readmissions	-2 [-18, 14]
ACS Hospitalizations	-10 [-38, 18]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the number of program participants (1,112), with an average length of program enrollment of 5.5 quarters and total number of participant-quarters (12,327).

Impact of DASH Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for a presentation of these findings.

Quality of Care (Survey and Qualitative Findings)

NORC's evaluation uses survey and qualitative data to assess the impact of the DASH program on quality of care, measured in terms of timeliness of services delivery and beneficiary experience. NORC developed a paper survey to be self-administered by enrollees, either independently or with help from a friend or family member (e.g., proxy), in consultation with the awardee. Three versions of the survey

[165] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

were fielded in May and June 2015: a full version to current enrollees, an abbreviated version to persons no longer enrolled (disenrolled), and an expanded version with 10 additional questions for proxy respondents, to capture information about the experiences of informal caregivers. The overall response rate was 32 percent (n=398, out of a sample of 1,270), of whom 21 percent (n=71) were proxy respondents; See Appendix F for the full set of survey findings. Qualitative data were gathered through interviews with program leadership and staff, senior residential facility representatives, review of program documents, and one site visit (May 2014) that included two focus groups with enrollees and informal caregivers, as well as direct observations.

Demographic Profile and Functional Status, Survey Respondents. Overall, survey respondents are representative of the DASH program's target population; most are age 60 or older and live independently. About three-quarters of respondents are at least 75 years old (77 percent), with 21 percent ages 65 to 74 years. Most are female (71 percent) and almost all (89 percent) identify as White, with 8 percent identifying as Hispanic or Latino. Nearly all report having at least a high school degree (93 percent) and 76 percent at least some college. Most DASH enrollees live alone (63 percent), with another 23 percent living with a spouse or partner. Almost all (91 percent) live independently or in an independent senior living setting. Of those providing an annual household income (n=304), 51 percent earn less than $25,000, with an additional 12 percent earning at least $50,000. Enrollees report a moderate level of functional impairment. Forty five percent report serious difficulty either walking or climbing stairs, 25 percent report difficulty either dressing or bathing, and 29 percent note serious difficulty with concentrating, remembering, or making decisions.

> "I really love DASH. They helped yesterday. I have shingles. The nurse came at 3 pm, the doctor at 4 pm, had my medicine by 7 pm and on my way to recovery."
>
> --Patient

Timeliness of Services Delivery. The DASH program lowers access barriers to care and helps enrollees receive appropriate care more promptly. Almost all survey respondents (98 percent) say that they are able to access DASH services quickly if needed, either on the phone or in-home, and that a DASH clinician will come to their home quickly if needed. Respondents describe receiving prompt medical care as the single most helpful outcome of DASH (36 percent). In focus groups, respondents describe how DASH improved access and timeliness, not only of services but also of communication with the enrollee's primary care physician.

Patient Experience and Satisfaction. Enrollees express strong enthusiasm for the DASH program. Many respondents cite their belief that California state regulations prohibit staff or residents in congregate settings (e.g., independent living, publicly subsidized buildings) from assisting someone who has fallen or injured themselves, which necessitates a call for an ambulance or fire truck. Focus group participants and interviewees consistently mention the value of rapid response triage in preventing the embarrassment and perceived waste of public resources involved with a 911 call.

- **Enrollment and Goals.** While the enrollment process is designed to be comprehensive, DASH participants recall or give priority to some aspects more than others. Enrollees are most likely to remember discussing their health and health history (90 percent) and when to call DASH, their primary care provider, or 911 (87 percent); their health care preferences (76 percent); and functioning (e.g., difficulties with bathing, getting dressed, and memory; 68 percent). Fifty five percent note

discussion about tobacco use, and 42 percent recall discussing how to sign up for community resources such as transportation. The most common goal motivating participants to enroll in DASH is to secure a safety net when they are not able to see their primary care physician (48 percent), followed by the goal of avoiding a hospital visit or aggressive treatment (27 percent). Considerably fewer participants share the primary goal of living independently (8 percent) or of gaining peace of mind (7 percent). Regardless of the specific goal, nearly all (99 percent) respondents agree that the DASH program supports the main goal expressed at enrollment.

- **Support for Patient Preferences.** Almost all DASH participants (98 percent) report that program staff takes their wishes into account when helping enrollees set their goals of care and when providing care. This ensures that the enrollment discussion on care preferences translates into practice. Over half (56 percent) agree or strongly agree that the DASH program helps them obtain needed service and supports, such as home health care.

- **Advance Care Planning.** A key objective of the enrollment process for DASH is to encourage beneficiaries to complete advance care plans, including designation of a health care agent or proxy and completion of the POLST form. Once signed by the enrollee's primary care physician, a POLST is recognized in California as a standing medical order appropriate for persons considered to be frail, older with multiple chronic conditions, or living with late-stage illness. Most survey respondents (80 percent) note discussion of the POLST during enrollment; among these respondents, 80 percent describe having conversations with family or a friend regarding treatment options and goals of care outlined in the POLST form. Seventy six percent completed the POLST form. Of this group, almost all agree or strongly agree that they have the information needed to make decisions about the POLST (92 percent). Of those who have not completed the POLST, 25 percent feel that they did not have to make advance care planning decisions yet, and 11 percent say that it is too difficult to make these decisions. Among the 34 percent of respondents who gave specific reasons for not completing the POLST, many describe completing other advance care planning forms (e.g., Five Wishes) instead.

- **Satisfaction.** Almost all DASH participants are satisfied or very satisfied with the program (94 percent). When DASH responds to a request for a home visit, 93 percent of respondents who have had a home visit answer that the nurses and doctors spend enough time with them. Eighty eight percent describe the DASH program as moving "at just the right pace," and, among those who pay a subscription fee for DASH (52 percent), 91 percent agree that the program is a good value. When asked to suggest one improvement for the DASH program, respondents advise extending the hours of operation (16 percent); increasing contact with staff (5 percent); and adding more staff for on-call service (4 percent). However, 44 percent responded with praise for DASH rather than suggestions for change.

- **Reasons for Disenrollment from DASH.** Respondents who are either no longer enrolled in DASH themselves, or serve as proxies for beneficiaries formerly enrolled in DASH, gave varied reasons for leaving the program. Those completing the survey (n=40) are more likely to be proxies (61 percent versus 21 percent for proxy respondents overall), likely reflecting further decline in health or functioning on the part of the family member or friend. Most proxies of disenrolled DASH participants are children (68 percent) or spouses (26 percent). Almost half of disenrolled beneficiaries

were reported to have done so on account of their death, moving to hospice care or an advanced care facility, or leaving Santa Barbara.

Informal (Family) Caregiver Experience and Satisfaction. Adult children of DASH enrollees are most likely to serve as proxy respondents (54 percent), followed by spouses of DASH enrollees (21 percent). While most proxies (62 percent) do not live with their DASH participant, they do report many caregiver hours each week. Of the proxies who gave an estimate (n=45), 73 percent provided at least 10 hours of care each week and 27 percent provided over 40 hours weekly. Sixty-four percent of proxies have been caring for a DASH enrollee for at least two years.

> "Relationship with DASH staff; a sense of security, an additional safety net. From one hour out of town, I have to take time off to go to an appointment [with my family member] and I still do that, but I don't have to leave work for something. It's a safety net."
> --Family caregiver

Most proxies (70 percent) agree or strongly agree that communication with their DASH enrollee has improved because of the DASH program. Almost half (47 percent) note that they experience less emotional stress in connection with caring for the DASH participant since enrollment. Thirty-seven percent report less physical strain, perhaps tied to the home visits made by DASH staff, and 20 percent report less financial hardship since their DASH care recipient enrolled in the program. Most (77 percent) indicate that the DASH program enables them to more easily coordinate care for the enrollee. Focus group findings reinforce survey results: caregivers shared their relief at not having to take days off from work or travel long distances to manage health crises that the program addresses at home, rather than the hospital or ED.

Workforce Development

Staffing. At full staffing level, the DASH team consists of the principal investigator (physician), two partner physicans, a project manager, a data analyst, a fulltime registered nurse who markets the program and enrolls participants, part-time administrative (medical) assistants, a nurse practitioner with palliative care expertise, and several contracted physicans, one who provides clinical training and supervision. In addition, a team of experienced RNs field calls, make rapid response home visits, and conduct follow-up, such as making referrals, calls to primary care providers, and appointments on behalf of participants. Staff are not shared with PCCSB but hired specifically to implement DASH, and turnover has been relatively low. Over time, DASH leadership has refined its hiring criteria for rapid responders, with the goal of hiring nurses with many years of experience and a mix of clinical and community experience. During the program's third year, DASH moved to using nurse practitioners and physicians as rapid responders for more complex calls.

> "Relating to patients and hearing their stories is rewarding. It's an additional reason we are there."
> --Provider

Training. The rapid response nurses are trained through on-the-job experience and shadowing, and at informal weekly case conferences where didactic material is presented on the specific needs of the geriatric patient population. These conferences are organized and facilitated by an experienced palliative care

> "Weekly case review builds rapport and team connection, allows for honest feedback from peers and physicians that improve quality of services and care."
> --Provider

physician identified as DASH's trainer. Team members or the physician propose subjects for these sessions in response to situations or topics encountered in the field, for example, giving background on a particular disease.

Implications for Workforce. The DASH model does not offer the prospect of significant change in how nurses or clinicians are used to deliver care to high-risk beneficiaries. Rather, over the course of implementation, program leaders have shifted the staffing model to better accommodate existing restrictions on scope of practice and reimbursement to sustain DASH beyond the HCIA funding period—for example, supplementing registered nurses with nurse practitioners and physicians for home visits to enable billing to Medicare or MediCal (Medicaid).

Context: DASH in its Third Year

As noted in NORC's Second Annual Report to CMMI (2016), Santa Barbara's small health care market and fragmented delivery system has imposed significant constraints on the capacity of PCCSB to implement and sustain the DASH program.

External Factors. PCCSB leadership describe its ongoing preparation to collaborate with risk-bearing entities in the near future, in the absence of capitation or global budgeting that might incorporate the costs of DASH. In addition, DASH continues to develop workarounds to address HIPAA and administrative concerns, which have resulted in a lack of access to information from Santa Barbara's sole acute care hospital about discharges of DASH enrollees or information about an enrollee who has entered hospice or died. DASH strengthens partnerships with individual physicians on transitional care for its patients, rather than trying to implement a more systematic approach with the hospital.

> "It comes back around to the immaturity of the market in our community. There is not an at-risk payer yet, in any significant degree, for the dual eligibles and there won't be until the beginning of 2018. We have got a ways to go. That is the medium range sustainability where we expect that they are going to give us some support and they've indicated that, but it's probably not likely to come in a long-term contract until we get to the 2018 mark."
> –PCCSB Project Leadership

Internal Factors. The strong, positive local reputation of PCCSB —and of DASH staff—continue to drive the program's success. The awardee has expanded organizational capacity so it can meet future payer needs. It has increased its ability to serve Spanish-speaking community members; changed the intake and triage system in order to handle larger numbers of people and scale to meet the anticipated needs of CenCal, a local Medi-Cal (Medicaid) provider; and added transitional care services for persons recently hospitalized or in the ED, also seen as valuable to CenCal.

> "For the long-range sustainability, we really think the primary financial beneficiaries of our programs are the payers. It's pretty clear that they are saving about $1,000/per patient/per year just by us providing those services, and that should be more than enough for them to reimburse us for that. Our long-range future is going to be working with at-risk payers and having them fund the program. Our medium-term sustainability because the at-risk payer market in the Santa Barbara area is immature continues to be patients paying for it themselves out of their own resources.."
> --PCCSB Principal Investigator

Sustaining the DASH Program

As noted in NORC's Second Annual Report, PCCSB tested multiple avenues of financial support, including fees for consumers, which is waived for low-income seniors, and subsidies from senior housing buildings and continuing care residences that have facilitated DASH enrollment for their residents. PCCSB made greater use of nurse practitioners and physicians in home visits, in order to address the medical complexity of enrollees with greater confidence. The staffing change also enables Medicare and Medicaid billing for home visits. With the use of NPs and MDs for home visits, PCCSB could serve in the future as a subcontractor to CenCal, providing care management to dually eligible residents, a shift from its earlier focus on Medicare FFS beneficiaries.

There are no plans to replicate or scale DASH beyond its current operations in the Santa Barbara area, where the awardee has successfully leveraged its existing relationships in the community and its clinical team.

Summary

The summative DID analyses provide evidence that the DASH program lowers utilization, as both all-cause hospitalizations and ED visits were significantly lower among DASH enrollees than the comparison group. The measure of total cost per beneficiary suggests possible savings but was not statistically significant for this population.

The cost and utilization experiences of the 358 DASH enrollees with payers other than Medicare FFS may not match that of the population analyzed for this evaluation, and so inclusion of their claims data, if it becomes available, would provide a more complete picture of the program. As well, our findings do not capture the impact of the DASH program over its entire period of performance. Estimates for measures of utilization could only be calculated for a limited number of quarters, particularly for readmissions and ACS admissions, due to the relatively low frequency of events. We plan to present our findings on the entire period, including the 12-month no-cost extension, in a forthcoming NCE Report to CMMI.

The DASH program has been received with enthusiasm, particularly among participants and caregivers. The program successfully met its goals of enabling beneficiaries to receive assessment and treatment at home, rather than at the hospital emergency department. DASH is highly regarded for timeliness of services delivery, a focus on identifying and supporting an enrollee's wishes, promoting advance care planning, and reducing the emotional, physical, and financing stresses of caregivers. PCCSB has built organizational capacity for DASH over the course of implementation, increasing the involvement of nurse practitioners and physicians in rapid response and centralizing phone-based triage. Project leadership offers a pragmatic vision for sustainability in the local health care market, given the lack of risk-based contracting, through a new partnership with CenCal, monthly fees for enrollees, recent data-sharing relationships with providers, and outreach through multiple community partners and venues.

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Pittsburgh Regional Health Initiative

Primary Care Resource Center (PCRC). The PCRC program provides intensive coordination and disease management for patients with chronic obstructive pulmonary disease (COPD); congestive heart failure (CHF); and acute myocardial infarction (AMI) through six hospital-based, virtual patient-centered medical homes.

PROGRAM MODELS: Care/Case Coordination, Chronic Disease Self-Management, Pharmaceutical Care, Transitional Care

LOCATION: Pennsylvania, West Virginia

GRANT: $10,419,511

AWARD DATES: 7/01/13 (launch date) to 2/29/16

NO-COST EXTENSION: 8 month, full program

PAYER(S): Medicare

REACH: 7,689 participants (88% of target)

POPULATIONS: Adults, Urban

DATA: Medicare claims (7/11-3/16); one site visit (6/14); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- "Perfect discharge bundle": comprises six coordination and quality review-related services, including medication review and discharge action plan.
- Motivational interviewing educates and motivates chronically ill patients to adopt better daily practices.

WORKFORCE

- Nurses, a pharmacist and administrative team member staff each PCRC.
- PCRC staff were largely long-time hospital employees who transitioned to the program.

CONTEXT

- Challenges initially recruiting hospitals to participate delayed the launch of the intervention.
- Strong PRHI leadership allowed intervention to effectively adapt midstream and work with hospitals.

OUTCOMES§

COST

- Reduction in 180-day cost of care for patients with AMI (-$7,907 per beneficiary-episode)
- Increase in 90-day cost of care for patients with CHF ($2,324 per beneficiary-episode)

UTILIZATION

- Decrease in 180-day emergency department (ED) visits (-26 per 1,000 beneficiary-episodes)
- Decreases in 90-day and 180-day ED visits for patients with COPD (-39 and -60 per 1,000 beneficiary-episodes, respectively)

QUALITY

- Increase in 7-day and 30-day practitioner follow-up visits per quarter (68 and 33 per 1,000 beneficiary-episodes, respectively)

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

Four out of the five PCRCs are reported to be continuing their centers after completion of HCIA funding. The NCE period was one of transition from grant to hospital funding, and provided an opportunity to demonstrate the business case for the PCRCs. The fifth PCRC site at Sharon, PA, plans to transition PCRC staff to a patient-centered medical home (PCMH) practice.

REPLICABILITY & SCALING

The awardee has no plans to scale the intervention.

§Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and are statistically significant at the p<0.10 level.

Overview of the Primary Care Resource Center Program

Background. The Pittsburgh Regional Health Initiative (PRHI) is an operating arm of the Jewish Healthcare Foundation and a regional health improvement collaborative (RHIC). As a nonprofit, PRHI encourages collaboration among health care providers and other stakeholders, including health plans, employers, and other payers. The HCIA award allowed PRHI to expand on previous work, including a project to develop a prototype PCRC. At the outset of the HCIA award in 2012, PRHI had difficulty recruiting hospitals in the area to participate in the initiative, which led to a delay in launching the PCRCs. Initially, PRHI primarily targeted large urban hospital systems, all of which ultimately declined to participate because of concerns about the initiative's impact on hospital revenue. The program's launch was further delayed when the first six regional hospitals recruited were disqualified from participating because they were already receiving CMS funding for other service delivery or payment initiatives.

PRHI's Primary Care Resource Center (PCRC) program provides pre- and post-discharge care coordination for older patients at high risk for re-hospitalization due to chronic obstructive pulmonary disease (COPD); congestive heart failure (CHF); and acute myocardial infarction (AMI). Based on the prototype hospital, Monongahela Valley Hospital in Monongahela, PA, PRHI has established six PCRCs in regional community hospitals in western Pennsylvania and the northern West Virginia panhandle. A team of nurse care managers and pharmacists implements each hospital-based PCRC, delivering inpatient services and home visits, as well as establishing telephone contact with patients and their primary care providers. The program is organized around a rubric of six key tasks called the "perfect discharge bundle" that comprises 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.

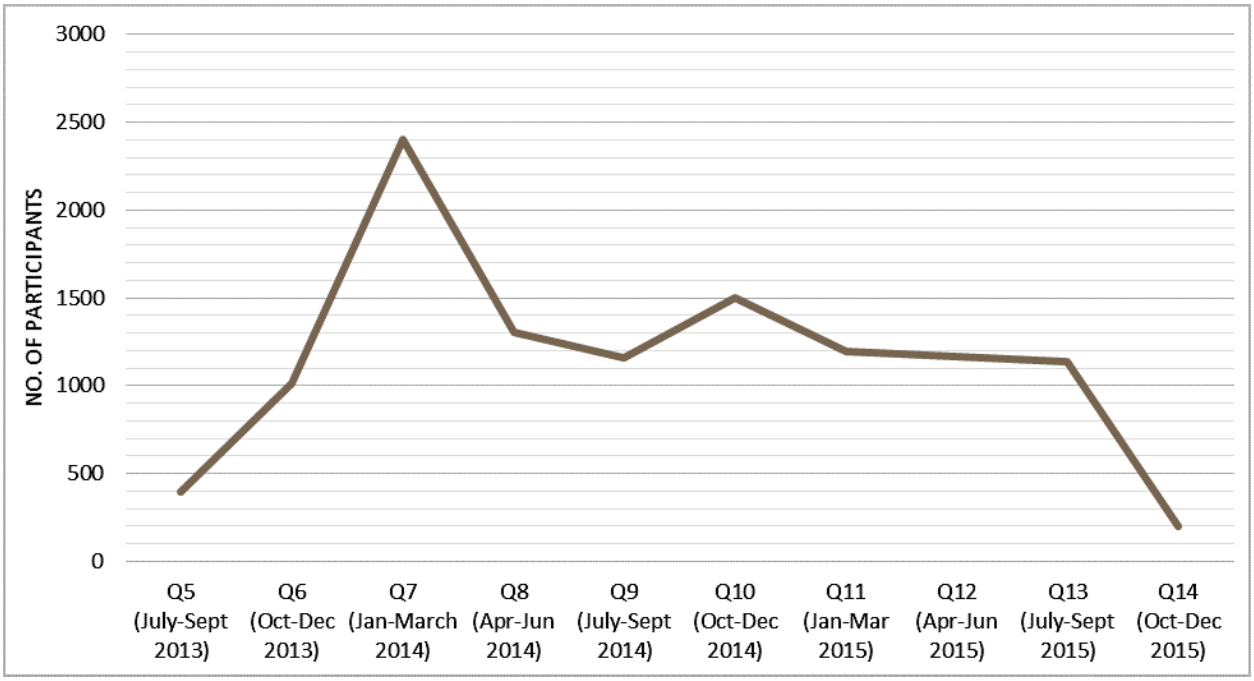
Goals. In addition to addressing the CMMI core measures, the PCRC intervention focuses on patient activation and improving the patient's overall experience of care.

Program Models and Practices. The PCRC intervention is testing the perfect discharge bundle and motivational interviewing to educate and motivate chronically ill patients to adopt better daily practices and to self-manage their conditions more effectively.

Implementation Updates. PRHI reported that the no-cost extension (NCE) period was critical to a total of four hospitals, which agreed to sustain their PCRC. Difficulty recruiting hospitals caused a delay in the start of the project; yet, the additional time during the NCE period helped hospitals appreciate the value of the PCRC and transition from grant funding to self-sustaining initiatives. Since NORC's Second Annual Report (2016), PRHI made a few changes to its PCRC model. A few PCRCs began to add target diseases (beyond AMI, CHF, and COPD) to the discharge protocol, including pneumonia (four hospitals), vascular disease (one hospital), and atrial fibrillation (one hospital). As previously reported, the PCRC at Uniontown Hospital ceased operations as of January 31, 2015. Additionally, Sharon Regional Health System Main Hospital officially stopped the intervention on October 29, 2015, due to financial constraints at the hospital. Two of the PRHI-trained PCRC care managers were moved to a patient-centered medical home practice near the hospital, while the PCRC pharmacist at Sharon was kept on and promoted to director of pharmacy for the health system.

Demographic Profile of Enrolled Beneficiaries. As of December 30, 2015, the PRHI had served a cumulative total of 7,689 unique direct participants since program launch. Enrollment in PRHI was delayed until the end of 2013, but then continued steadily through 2014 and the first three-quarters 2015 before decreasing in the final quarter of operation (see Exhibit PRHI.1).[166] During the most recent quarter for which data are available (October 1 through December 30, 2015), the program served 201 unique participants. Close to three-quarters of participants are 65 years or older (71 percent). About half of participants are female (51 percent). Most participants are identified as White (97 percent).

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



Summative Findings (Outcomes)

Across all conditions, the PCRC program improves rates of practitioner follow-up 7 and 30 days post-discharge and reduces 180-day emergency department (ED) visits. Relative to peer hospitals in the region, some of which may have had readmission reduction programs, PCRC program over its course, did not significantly lower costs of care, hospitalizations, or readmissions.The program reduces cost of care for patients with AMI; increases cost of care, hospitalizations, and readmissions for patients with CHF; and reduces ED visits for patients with COPD.

In the following section, we present our analyses of program effectiveness, based on two types of data: Medicare Fee-For-Service (FFS) claims and narrative from NORC interviews and one site visit.

[166] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent PRHI self-reported data available for NORC's Third Annual Report is for HCIA reporting quarter 14, for the time period October 1 through December 31, 2015.

Core and Supplemental Measures

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day Total Cost of Care per beneficiary-episode
- 180-day Total Cost of per beneficiary-episode
- 90-day All-cause Hospitalizations
- 180-day All-cause Hospitalizations
- 90-day ED Visits
- 180-day ED Visits
- 30-day Readmissions
- 7-day Practitioner Follow-up Visits
- 30-day Practitioner Follow-up Visits

Our hospital analysis compares the experiences of PCRC enrollees with those of a weighted group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's PCRC program over the implementation period as a whole and in each quarter of program implementation. Our analysis is for Medicare FFS beneficiaries, comprising 41 percent of Medicare enrollees in the program.[167] We also present a subgroup or stratified analysis that assesses impact for each of the program's three targeted conditions separately (AMI, CHF, COPD).

Finder File and Creation of Analytic Sample. PRHI was not able to provide a finder file that lists program participants and enrollment dates. As a result, we use Medicare claims-based attribution rules to identify participants in the PCRC intervention.[168] Our analytic sample comprises 5,158 unique beneficiary-episodes discharged alive with a diagnosis of AMI, COPD, or CHF from one of the six participating PRHI hospitals during the intervention period.[169] The awardee estimates that about 75 percent of patients admitted with these diagnoses actually received PCRC services.

Comparison Group. We use Medicare claims and the CMS provider of service (POS) file to create an external comparison group of 10 comparison community hospitals in geographic proximity to the awardee-affiliated hospitals.[170] We use propensity score weighting (standardized mortality ratio weights) to minimize observed differences in beneficiary-episode characteristics between the PRHI treatment and comparison groups. To account for variations in beneficiary-episode with different conditions (AMI, COPD, or CHF) and achieve better balance, we first stratify by each condition, then estimate relative weights within each stratum and pool weights across strata. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[171]

Descriptive Characteristics. Exhibit PRHI.2 displays the descriptive characteristics of beneficiary-episodes (discharges) for the treatment and comparison groups before and after implementation of the intervention. We compare the two groups with respect to demographics, comorbidities, prior utilization,

[167] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[168] Medicare claims July 1, 2011 through March 31, 2016. We include discharges before September 30, 2015, allowing for 90 day episodes through December 31, 2015 and claims run off through March 31, 2016.

[169] The post-intervention group includes beneficiaries enrolled in the PCRC program from July 1, 2013, through June 30, 2015. One of the six hospitals, Uniontown, terminated participation in the program after December 31, 2014; we excluded episodes at that hospital after this date from analysis.

[170] The ten comparison hospitals are Jameson Memorial Hospital, Meadville Medical Center, Monongalia (Mon) General Hospital (WV), 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.

[171] For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

and discharge setting.[172] During the post-intervention period, beneficiary-episodes attributed to the PRHI program have higher rates of COPD (with lower rates of CHF), higher levels of utilization and cost prior to a skilled nursing facility (SNF) or home health.

Exhibit PRHI.2: Descriptive Characteristics for PCRC and Comparison Group Medicare Beneficiary-Episodes

	Pre-Intervention		Post-Intervention	
Variable	**PRHI**	**Comparison**	**PRHI**	**Comparison**
Number of Beneficiary Episodes	**5,330**	**11,873**	**5,158**	**12,267**
Age Group % (N) * **				
< 65 years	16.5 (879)	15.8 (1870)	16.9 (874)	16.2 (1990)
65-69 years	14.9 (793)	14.0 (1666)	16.5 (852)	14.4 (1763)
70-74 years	13.2 (703)	14.3 (1694)	13.3 (688)	15.1 (1858)
75-79 years	13.2 (706)	13.7 (1624)	14.2 (734)	14.6 (1795)
80-84 years	15.4 (821)	16.7 (1985)	13.6 (704)	13.9 (1707)
≥85 years	26.8 (1428)	25.6 (3034)	25.3 (1306)	25.7 (3154)
Race/Ethnicity % (N) *				
White	96.4 (5140)	96.5 (11463)	96.0 (4951)	95.6 (11725)
Black	3.1 (167)	2.5 (295)	3.3 (169)	3.3 (409)
Other	0.4 (23)	1.0 (115)	0.7 (38)	1.1 (133)
Gender % (N)				
Female	52.8 (2816)	53.1 (6305)	51.1 (2637)	52.1 (6389)
Target Conditions % (N)				
AMI	24.6 (1311)	22.7 (2691)	23.0 (1185)	23.2 (2850)
CHF *	37.4 (1993)	39.6 (4701)	40.5 (2091)	41.6 (5102)
COPD **	38.0 (2026)	37.7 (4481)	36.5 (1882)	35.2 (4315)
Hierarchical Chronic Conditions (HCC)				
Mean HCC Score (Standard Deviation)	5.4 (3.0)	5.4 (3.0)	5.6 (3.1)	5.6 (3.0)
Mean Count of HCCs (SD)	3.2 (1.8)	3.2 (1.7)	3.3 (1.8)	3.3 (1.7)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes unless noted)				
Total Medicare Cost (SD) per beneficiary-episode ***	$30,737 ($40,561)	$29,305 ($45,638)	$32,044 ($67,783)	$29,474 ($39,197)
Hospitalizations (SD) ***	1,698 (2,793)	1,627 (2,451)	1,755 (3,543)	1,511 (2,451)
ED Visits (SD) ***	1,356 (3,779)	1,217 (2,661)	1,573 (4,039)	1,312 (2,759)
Coverage Reason % (N)				
Age	67.6 (3602)	68.6 (8141)	66.3 (3419)	67.2 (8249)
Disability	30.6 (1633)	29.9 (3548)	32.4 (1669)	31.3 (3835)
End-Stage Renal Disease (ESRD)	0.7 (37)	0.3 (39)	0.4 (19)	0.4 (51)
Disability & ESRD	1.1 (58)	1.2 (145)	1.0 (51)	1.1 (132)
Discharges * % (N)**				
Home	41.0 (2186)	53.3 (6332)	45.8 (2361)	50.7 (6216)
SNF	18.9 (1005)	14.7 (1750)	16.8 (868)	14.3 (1756)
HHA	24.1 (1284)	16.0 (1904)	21.3 (1100)	17.8 (2189)
Hospice	2.3 (123)	2.2 (256)	2.3 (121)	2.8 (349)
Other	13.7 (732)	13.7 (1631)	13.7 (708)	14.3 (1757)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

[172] We test differences between these groups with 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).

Impact of PCRC program. Exhibit PRHI.3 displays the average quarterly and aggregate impact of PCRC on its participants relative to the comparison group. We report utilization measures as binary indicators, noting whether or not any event occurred following each episode in the specified timeframe for a specific beneficiary (beneficiary-quarter).[173] We find the following, relative to the comparison group:

- **Cost:** A non-significant decrease in 90- and 180-day total cost of care.
- **Utilization Measures:** A significant decrease in 180-day ED visits (26 per 1,000 beneficiary-episodes per quarter).
- **Quality of Care Measures:** Significant increases in 7-day (68 per 1,000 beneficiary-episodes per quarter) and 30-day (33 per 1,000 beneficiary-episodes per quarter) practitioner follow-up.

Exhibit PRHI.3: Impact of PCRC on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total 90-day Cost of Care per Beneficiary-episode ($)	-$24 [-$1,385; $1,337]
Total 180-day Cost of Care per Beneficiary-episode ($)	-$1,732 [-$3,898; $434]
90-Day All-cause Hospitalizations	5 [-13, 23]
180-Day All-cause Hospitalizations	-2 [-22, 18]
90-Day ED Visits	-11 [-31, 9]
180-Day ED Visits	**-26 [-48, -4] ***
30-Day Readmissions	13 [-6, 32]
7-Day Practitioner Follow-up Visits	**68 [32, 104] *****
30-Day Practitioner Follow-up Visits	**33 [14, 52] *****
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total 90-Day Cost of Care ($)	-$122,108 [-$7,140,975; $6,896,759]
Total 180-Day Cost of Care ($)	-$8,931,162 [-$20,105,217; $2,242,893]
90-Day All-cause Hospitalizations	24 [-70, 118]
180-Day All-cause Hospitalizations	-10 [-112, 92]
90-Day ED Visits	-59 [-162, 44]
180-Day ED Visits	**-135 [-250, -20] ***
30-Day Readmissions	67 [-29, 163]
7-Day Practitioner Follow-up Visits	**352 [167, 537] *****
30-Day Practitioner Follow-up Visits	**171 [73, 269] *****

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where findings reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the number of program participants (5,158) and length of program implementation (9 quarters).

Subgroup Analysis: Impact of PCRCs Stratified by Target Condition. While the analysis above considers all program participants together in a pooled analysis, Exhibit PRHI.4 below presents a stratified analysis that considers the impact of PCRC participation on beneficiary-episodes for patients

[173] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

with each of the three conditions targeted for quality improvement. We find the following, relative to the comparison group (limited for each analysis to patients with the same condition):

- **AMI:** A decrease in 180-day total cost of care per quarter (-$7,907 per beneficiary-episode) and an increase in the likelihood of practitioner follow-up visits within 7 days post-discharge per quarter (49 per 1,000 beneficiary-episodes).
- **CHF:** Increases in 90-day total cost of care ($2,324 per beneficiary-episode); 90-day hospitalizations (28 per 1,000 beneficiary-episodes); and 30-day readmissions per quarter (30 per 1,000 beneficiary-episodes), together with significant increases in practitioner follow-up visits within 7 and 30 days post-discharge per quarter (101 and 39 per 1,000 beneficiary-episodes, respectively).
- **COPD:** Decreases in 90- and 180-day ED visits per quarter (-39 and -60 per 1,000 beneficiary-episodes, respectively) and an increase in follow-up visits within 30 days post-discharge per quarter (36 per 1,000 beneficiary-episodes).

Exhibit PRHI.4: Impact of PCRC on Patients with Acute Myocardial Infarction

PATIENTS WITH ACUTE MYOCARDIAL INFARCTION ONLY	
AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total 90-day Cost of Care per Beneficiary-episode ($)	-$3,470 [-$7,297; $357]
Total 180-day Cost of Care per Beneficiary-episode ($)	**-$7,907 [-$15,400; -$414] ***
90-Day All-cause Hospitalizations	-22 [-57, 13]
180-Day All-cause Hospitalizations	-10 [-57, 37]
90-Day ED Visits	10 [-25, 45]
180-Day ED Visits	16 [-16, 48]
30-Day Readmissions	20 [-13, 53]
7-Day Practitioner Follow-up Visits	**49 [3, 95] ***
30-Day Practitioner Follow-up Visits	16 [-20, 52]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total 90-Day Cost of Care ($)	-$4,112,408 [-$8,646,997; $422,181]
Total 180-Day Cost of Care ($)	**-$9,370,188 [-$18,249,694; -$490,682] ***
90-Day All-cause Hospitalizations	-26 [-67, 15]
180-Day All-cause Hospitalizations	-11 [-66, 44]
90-Day ED Visits	12 [-30, 54]
180-Day ED Visits	19 [-19, 57]
30-Day Readmissions	24 [-15, 63]
7-Day Practitioner Follow-up Visits	**58 [3, 113] ***
30-Day Practitioner Follow-up Visits	19 [-23, 61]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where findings reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all implementation quarters. Aggregate Impact is estimated for this awardee based on the number of participants with AMI (1,185) and the length of program implementation (9 quarters).

Exhibit PRHI.5: Impact of PCRC on Patients with Congestive Heart Failure

PATIENTS WITH CONGESTIVE HEART FAILURE ONLY	
AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total 90-day Cost of Care per Beneficiary-episode ($)	**$2,324 [$857; $3,791] *** **
Total 180-day Cost of Care per Beneficiary-episode ($)	$2,162 [-$112; $4,436]
90-Day All-cause Hospitalizations	**28 [0, 56] ***
180-Day All-cause Hospitalizations	11 [-7, 29]
90-Day ED Visits	7 [-23, 37]
180-Day ED Visits	-16 [-52, 20]
30-Day Readmissions	**30 [5, 55] ** **
7-Day Practitioner Follow-up Visits	**101 [62, 140] *** **
30-Day Practitioner Follow-up Visits	**39 [10, 68] ** **
AGGREGATE IMPACT [§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total 90-Day Cost of Care ($)	**$4,860,199 [$1,792,548; $7,927,850] *** **
Total 180-Day Cost of Care ($)	$4,519,722 [-$234,890; $9,274,334]
30-Day Readmissions	**63 [11, 115] ** **
90-Day All-cause Hospitalizations	**60 [2, 118] ***
180-Day All-cause Hospitalizations	24 [-13, 61]
90-Day ED Visits	15 [-49, 79]
180-Day ED Visits	-33 [-108, 42]
7-Day Practitioner Follow-up Visits	**212 [130, 294] *** **
30-Day Practitioner Follow-up Visits	**82 [21, 143] ** **

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where findings reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all implementation quarters. Aggregate Impact is estimated for this awardee based on the number of participants with CHF (2,091) and the length of program implementation (9 quarters).

Exhibit PRHI.6: Impact of PCRC on Patients with Chronic Obstructive Pulmonary Disease

PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ONLY	
AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary-episode ($)	$205 [-$1,691; $2,101]
Total 180-day Cost of Care per Beneficiary-episode ($)	-$1,068 [-$4,358; 2,222]
90-Day All-cause Hospitalizations	-5 [-29, 19]
180-Day All-cause Hospitalizations	-12 [-44, 20]
90-Day ED Visits	**-39 [-67, -11] ** **
180-Day ED Visits	**-60 [-85, -35] *** **
30-Day Readmissions	-10 [-43, 23]
7-Day Practitioner Follow-up Visits	43 [-5, 91]
30-Day Practitioner Follow-up Visits	**36 [13, 59] *** **

PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ONLY	
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total 90-Day Cost of Care ($)	$385,344 [-$3,183,292; $3,953,980]
Total 180-Day Cost of Care ($)	-$2,009,052 [-$8,200,015; $4,181,911]
90-Day All-cause Hospitalizations	-10 [-55, 35]
180-Day All-cause Hospitalizations	-23 [-83, 37]
90-Day ED Visits	**-73 [-126, -20] ****
180-Day ED Visits	**-112 [-158, -66] *****
30-Day Readmissions	-19 [-81, 43]
7-Day Practitioner Follow-up Visits	82 [-8, 172]
30-Day Practitioner Follow-up Visits	**68 [25, 111] *****

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where findings reach statistical significance. §Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§Aggregate Impact is the total DID estimate for all program participants across all implementation quarters. Aggregate Impact is estimated for this awardee based on the number of participants with COPD (1,882) and the length of program implementation (9 quarters).

Impact of PCRC Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Workforce Development

Staffing. In general, PCRC staffing follows the same structure at all of the sites. Two or three nurse care managers staff each PCRC team, along with a pharmacist and an administrative staff member who assists with data management. One of the nurse care managers leads the PCRC and is responsible for coordinating staff efforts. PCRC staff members are hospital employees who are selected by hospital leadership with salaries covered by HCIA funding. Many staff members hired for the PCRCs are long-time employees who transitioned from other positions within the hospital. The internal hiring arrangement ensures that PCRC staff understand the hospital culture, are accepted by peers, and have established constructive working relationships with the physicians and nurses who facilitate communication about PCRC participants. The pharmacists on the PCRC teams have a distinctive role. PCRCs sought pharmacists with a combination of retail experience and hospital pharmacy experience, as the pharmacists need to both coordinate the hospital discharge process and work directly with patients to complete medication reconciliation.

Training. PRHI offers training to PCRC staff in three areas: Perfecting Patient Care (PPC) University, motivational interviewing, and advanced clinical support. Training includes nearly 40 hours of classroom-based courses, shorter classes on continuous quality improvement, and courses specific to the intervention. PPC is a trademarked educational program developed by PRHI that is based on patient-centered principles and uses a team-based problem-solving approach to assist health care organizations design work processes that reveal and correct problems. PPC training occurs over three full-day sessions offered over the course of several weeks, allowing time for homework in between the full-day sessions. There are both didactic sessions and hands-on sessions, where participants see the work in-action.

There has been some turnover among nurse care managers staffing the PCRCs. Given the complex duties of the PCRC position, which include organizing a new unit and creating a set of brand-new activities,

some staff found that it was not a good fit. In the first six months of the project, seven staff members, including nurse care managers and administrative staff, left the PCRCs and were replaced.

Implications for Workforce. As presented in NORC's Second Annual Report to CMMI (2016), we find in our workforce survey that PCRC respondents have a positive view of program trainings; this finding is consistent with observations from focus groups conducted by NORC during the site visit. Respondents rate the trainings as useful and say that they feel prepared to do their jobs; they rate motivational interviewing as one of the most useful trainings. PCRC staff report moderate levels of stress yet say they experience the work as rewarding. In fact, the majority of staff members are very satisfied with many aspects of their jobs, including work/life balance, the quality of care they provide to patients, PCRC collegiality, and level of autonomy.

Context: PRHI in its Third Year

PRHI leadership noted that hospitals, which were facing penalties under Medicare's Hospital Readmission Reduction Program, saw increased care coordination and transition of care as an important gap that needed to be filled. Hospitals needed help implementing such an initiative, and PRHI has a strong reputation for quality improvement in the region. Recognizing PRHI as a trusted partner, hospital leadership and boards agreed to participate in the program because of PCRC's focused intervention, the hospitals' patient mix of Medicare beneficiaries with high chronic diseases (e.g., COPD and CHF); and the backing of CMMI. PRHI also noted that the intervention seemed to excel in hospitals where the PCRC model was not competing against other initiatives for staff time and resources.

It is also worth noting that PRHI leadership overcame several daunting challenges during the course of the implementation. These included the recruitment of new hospitals to participate after the initial hospitals were disqualified because they were already receiving CMS funding for similar initiatives and handling staff turnover, including among PRHI project managers.

Sustaining, Replicating, and Scaling PRHI

Since our Second Annual Report, where we reported that two of the five hospitals planned to continue the PCRC model after HCIA funding (the sixth PCRC, Uniontown, closed before the end of HCIA funding in January, 2015), two additional hospitals decided to sustain the PCRC model after grant funding. The NCE, which demonstrated PCRC's value and added time to transition from grant funding to hospital funding, played an important role in the hospitals' decision. The fifth PCRC site at Sharon will transition PCRC staff to a patient-centered medical home (PCMH) practice. Sharon was recently acquired by the for-profit provider Community Health Services, which is currently engaged in workforce reduction due to a negative operating margin.

Summary

Relative to a comparison group, the PCRC program significantly decreased the likelihood of 180-day post-discharge ED visits, and significantly increased the likelihood of post-discharge practitioner follow-up for its program participants. Among the three conditions targeted by PCRC, the program significantly decreased 180-day post-discharge cost for participants with AMI, significantly decreased the likelihood of

90- and 180-day post-discharge ED visits for participants with COPD, and significantly increased the likelihood of post-discharge practitioner follow-up for participants with AMI, COPD, and CHF. For participants with CHF, the program showed a significant increase in 90-day post-discharge cost, limiting the impact of the overall program on decreasing 90-day costs.

The following limitations of our quantitative findings should be noted. First, our findings are limited to Medicare FFS beneficiaries who comprise approximately 30 percent of PCRC's participants. We are unable to study program impacts for Medicare Advantage beneficiaries, who comprise approximately 59 percent of the PCRC program. Second, we assume an intent-to-treat approach in studying the impact of PCRC on beneficiaries with AMI, CHF, and COPD discharged from PCRC hospitals during the intervention period. The awardee estimates that 75 percent of these patients may have actually received the PCRC intervention. We are therefore unable to estimate the impact of PCRC on those actually treated. Finally, our findings do not capture impact of PCRC over its entire period of performance, which extended until February 2016. We will present our findings on the entire period, including the eight-month NCE, in a forthcoming report.

References

HCIA Narrative Progress Report for Pittsburgh Regional Health Initiative, for Reporting Quarter End Date 12/31/2015. Submitted by PRHI, 1/31/2016.

HCIA Quarterly Report for PRHI, for Reporting Quarter End Date 12/31/2015. Submitted by PRHI, 3/02/2016.

Providence Portland Medical Center

Health Commons. Co-sponsored by Health Share of Oregon, a regional Coordinated Care Organization (CCO) and the Providence Portland Medical Center (PPMC), this innovation has the goal of creating an integrated patient-centered system to improve care coordination, care quality, and health outcomes among high-cost, high-acuity Medicaid beneficiaries (Health Share patients). Health Commons comprises seven separate programs, each with distinct objectives, staffing mix, and implementation partners.

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Care/Case Coordination, Collaborative Medical Home, ED Diversion, Patient Navigation

LOCATION: Portland, OR

GRANT: $17,337,093

AWARD DATES: 9/01/12 to 9/28/15

NO-COST EXTENSION: 3 month, project close-out

PAYER(S): Medicaid, Dually Eligible, Uninsured

REACH: 15,421 beneficiaries (100% of target)

POPULATIONS: Adults, Behavioral Health/Substance Abuse, Urban

DATA: Medicaid claims (1/11- 9/13); NORC workforce trainee survey (5/15-6/15); two site visits (3/14 and 5/15); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Trauma-Informed Care approach is used to engage high-risk patients.
- Health Commons has maintained fidelity to its initial implementation model

WORKFORCE

- Social workers, lay health workers, and health behavior specialists working with a population with mental health needs.
- Training includes two-week classroom-based sessions and mentoring.

CONTEXT

- Well-educated and experienced staff were better able to manage patients with complex conditions.
- PPMC's internal evaluation team enabled mid-course changes by project leadership to patient targeting criteria and to improve program effectiveness.

OUTCOMES§

COST

Reduction in total quarterly cost of care for:

- Health Resilience Program (-$408 per beneficiary)
- New Directions (-$1,220 per beneficiary)
- ED Guides (-$381 per beneficiary)
- Standard Transitions (-$1,081 per beneficiary)
- Care Transitions (-$681 per beneficiary)

UTILIZATION

- Reduction in hospitalizations per quarter for ED Guides (-15 per 1,000 beneficiaries)
- Decrease in ED visits per quarter for New Directions (-162 per 1,000 beneficiaries) and ED Guides (-328 per 1,000 beneficiaries)

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

Health Commons is sustaining all intervention programs, post-HCIA funding. The aims of the HCIA-supported innovation and those of the CCO Health Share, and their organizational partners, have remained aligned as the CCO matured, as part of the new Medicaid health care delivery system model in Oregon.

REPLICABILITY & SCALING

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 opportunities for replication in other CCOs within Oregon. Additionally, PPMC and CareOregon (a Medicaid managed care entity that operates in Health Share as well as other CCOs) may likewise spread intervention components to other locations.

§Outcomes for cost and utilization are from analyses that include a comparison group and are statistically significant at the $p<0.10$ level.

Overview of the Health Commons Program

Background. The Health Commons program is a wide-ranging project sponsored by two large stakeholders: the Providence Portland Medical Center (PPMC) and Health Share of Oregon. PPMC is part of Providence Health & Services, the third largest nonprofit health system in United States, which operates in Alaska, California, Oregon, Montana, and Washington. In 2014, Oregon reorganized its Medicaid program into regional, accountable coordinated care organizations (CCOs); each CCO receives a global budget to provide coordinated care to assigned Medicaid members. Health Share of Oregon CCO was formed through a partnership between four health systems (Providence Portland, Legacy, Kaiser Permanente, and Oregon Health and Science University); three county-based mental health centers (in Multnomah, Clackamas, and Washington counties); the CareOregon Medicaid system; and the Coalition of Community Health Centers.

Many of the Health Commons interventions were adopted and adapted from interventions already established by one or more partner organizations. The Standard Transitions model was based on work that Kaiser Permanente had done around discharge summaries. The Tri-County 911 program was started in Multnomah County, and the Intensive Transition Teams (ITT) program grew from a program in Washington County that was adapted to fit the needs of Clackamas and Multnomah counties. CareOregon had pioneered the work with community health workers and outreach that developed into the Health Resilience Program (HRP) and Integrated Community Care Teams (ICCT) programs. Through its partnerships the CCO has been able to adopt best practices and services from the Health Share community to replicate and spread across the Health Commons project.

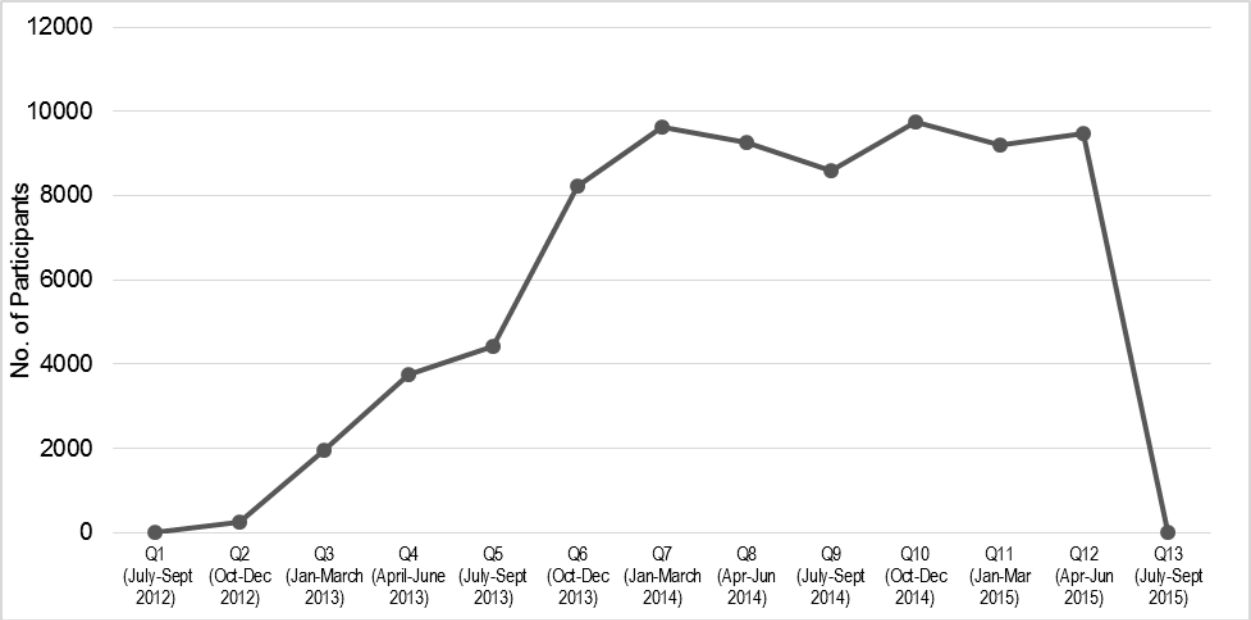
Goals. In addition to addressing the CMMI core measures—all-cause hospital admissions, hospital readmissions, emergency department (ED) visits, and total cost of care—the Health Commons intervention focuses on reducing avoidable hospitalizations and increasing access to care, use of primary care services, and patient health.

Program Models. As described in the First Annual Report, the Health Commons program includes multiple program components across multiple settings. Earning patients' trust is a vital part of the Health Commons patient engagement process, and staff uses motivational interviewing and trauma-informed care training to build trust and rapport with high-risk patients. Many intervention components focus on helping patients with substance abuse or mental health needs seek primary care services or social supports, including housing. The largest program component, the HRP, uses 16 health resilience specialists in primary care clinics to help high-utilizing patients with chronic conditions better manage their disease and increase health literacy. Health Commons also serves patients facing chronic homelessness. The Central City Concern Health Improvement Project (CHIPS) uses outreach workers including a peer wellness specialist, a registered nurse, and mental health professionals to provide health care services and housing to homeless populations.

Implementation Updates. Since NORC's Second Annual Report to CMMI (2016), Health Commons has made few changes to its intervention. Health Commons received a no-cost extension (NCE) to proceed with an orderly closeout until September 28, 2015. All Health Commons' intervention components are being sustained, and project staff used the NCE period to ensure a smooth transition of the intervention components to organization partners.

Reach and Demographic Profile of Enrolled Beneficiaries. As of September 30, 2015, Health Commons had served a cumulative total of 15,421 unique direct participants since program launch. Enrollment rose steadily through 2013 and remained steady through 2014 and 2015 until the last month of enrollment in June 2015 (see Exhibit PPMC.1).[174] During the most recent quarter for which data are available and participants were served (April 1 through June 30, 2015), the program served 3,299 unique participants. Close to three-quarters of the participants are between 26 to 64 years old (72 percent) and 9 percent are 19 to 25 years. At least 50 percent are female. Most participants are identified as White (58 percent), 14 percent are Black or African American, and 24 percent have an unknown race/ethnicity.

Exhibit PPMC.1: Total Number of Health Commons Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

Within the Health Commons program, five of the awardee's intervention programs reduce cost of care (Health Resilience Program, New Directions, ED Guides, Standard Transitions, and C-TRAIN), but only two programs (New Directions and ED Guides) result in decreased utilization (Exhibit PPMC.2).

[174] The awardee continued operations through QR13 in order to close out the program, but no participants were served in this reporting quarter (July 1-September 30, 2015).

Exhibit PPMC.2: Claims-based Findings for PPMC Programs

Intervention (% of Total Health Share Program Participants)	Description	Statistically Significant Findings
Health Resilience Program (17%)	Embeds Health Resilience Specialists in primary care clinics to assist high-utilizing participants with chronic conditions with disease management and health literacy.	▪ Reduction in total quarterly cost of care [-$408 per beneficiary]
New Directions (3%)	Embeds LCSWs in Emergency Department at Oregon Health and Science University, targeting beneficiaries with mental health diagnosis and high utilization of ED, attending mental health and primary care appointments.	▪ Reduction in total quarterly cost of care ▪ [-$1,220 per beneficiary] ▪ Reduction in ED visits per quarter [-162 per 1,000 beneficiaries]
ED Guides (45%)	ED diversion program targeting high utilizer beneficiaries with non-acute needs, patient navigation, and care coordination.	▪ Reduction in total quarterly cost of care [-$381 per beneficiary] ▪ Reduction in hospitalizations per quarter [-15 per 1,000 beneficiaries] ▪ Reduction in ED visits per quarter [-328 per 1,000 beneficiaries]
Standard Transitions (21%)	Build a standard, enhanced discharge summary into hospital EMRs and incorporate standard protocols for hospital transitions into primary care clinical workflows.	▪ Reduction in total quarterly cost of care ▪ [-$1,081 per beneficiary] ▪ Increase in ED visits per quarter [154 per 1,000 beneficiaries]
C-TRAIN (10%)	Provides high-intensity transitions support to high-utilizing participants discharged from hospitals.	▪ Reduction in total quarterly cost of care [-$681 per beneficiary]

NOTE: Statistical significance assessed at p<0.1 using two tailed tests.

In the section below, we present our analyses of program effectiveness, based on three types of data: Medicaid claims, NORC's survey of workforce trainee experience, and narrative from NORC interviews and two site visits. Our evaluation includes claims-based findings for five of the awardee's seven HCIA-funded innovation arms; findings for the sixth arm (ITT) are limited to a description of treatment and comparator beneficiary characteristics due to limited claims. No findings are presented for the seventh arm (CHIPS) due to data limitations.

Core Measures: Health Resilience Program

Our analysis compares the experiences of Health Share enrollees in HRP with those of a matched group of comparators. We examine the impact of the HRP program on participants' cost and utilization over the entire enrollment period and in each quarter of program enrollment.

Measures (per 1,000 beneficiaries unless noted)
- Total Cost of Care per beneficiary
- All-Cause Hospitalizations
- ED Visits

Finder File and Creation of Analytic Sample, Health Resilience Program. PPMC provided a data file that listed program participants and enrollment dates. We linked this file to Oregon Medicaid Alpha-MAX claims to enable us to calculate outcome measures

for these beneficiaries.[175] We identified 12,622 unique beneficiaries, with 750 beneficiaries enrolled in HRP. We further limited this number by Medicaid identifiers, risk scores, and comorbidities to yield an analytic sample of 607 beneficiaries.

Comparison Group, Health Resilience Program. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had an ED visit occurring during the same calendar year as the HRP participants (2011-2013), and had at least two additional ED visits or a hospitalization in the prior year. We use propensity score matching without replacement to find appropriate comparators.[176] The final propensity score model uses the following covariates: age; race (Black); CDPS risk score; indicators for dual eligibility and disability eligibility; chronic medical condition flags for asthma, chronic obstructive pulmonary disease (COPD), congestive heart failure (CHF), depression, diabetes, and liver disease; number of ED visits in the prior year; number of hospital admissions in the prior year; and total cost of care in the prior year.[177] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, Health Resilience Program. Exhibit PPMC.3 displays the descriptive characteristics of beneficiaries in the target and comparison groups, with respect to demographics, comorbidities, and prior utilization.[178] HRP participants are more likely to be female and younger, and to have a flag on their claims for high utilizer status and more hospitalizations in the period prior to enrollment, than are comparators. The two groups are similar in distribution of other demographic, health, eligibility, cost, and ED utilization.

Exhibit PPMC.3: Descriptive Characteristics for PPMC Health Resilience Program and Comparison Group Beneficiaries

Variable	Health Resilience Program	Comparison
Number of Beneficiaries	607	607
Mean Number of Quarters Enrolled [Range]***	2.4 [1-4]	3.6 [1-4]
Gender % (N) *		
Female	69.0 (419)	64.4 (391)
Age % (N)**		
20-29 years	12.5 (76)	10.0 (60)
30-39 years	15.5 (94)	14.8 (90)
40-49 years	19.9 (121)	16.6 (101)
50-59 years	32.3 (196)	34.4 (209)
≥60 years	18.5 (112)	21.8 (132)

[175] Medicaid claims from the Oregon Medicaid Alpha-MAX are available for the time period January 1, 2011 through September 30, 2013.

[176] For more information on propensity score matching, please refer to Appendix D.

[177] Our propensity score model did not include psychiatric disorder or chemical dependency, both of which are prevalent conditions among HRP enrollees and would be important matching variables. NORC's follow-up analyses, to be incorporated in a no-cost extension report, will include these variables in the propensity score matching model.

[178] We test differences between the groups with a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, disability, eligibility, and chronic diseases).

Variable	Health Resilience Program	Comparison
Race/Ethnicity % (N)		
White	64.9 (394)	66.9 (406)
Black/African American	24.1 (146)	23.1 (140)
Hispanic	4.0 (24)	5.1 (31)
Dual Eligible Status % (N)		
Dually Eligible	19.6 (119)	19.9 (121)
Reason for Medicaid Eligibility % (N)		
Disability	60.8 (369)	62.6 (380)
Risk Score		
CDPS Risk Score, Mean (Standard Deviation)	3.3 (1.9)	3.3 (2.5)
High Utilizer Flag§ (N) ***	86.3 (524)	76.9 (467)
Condition % (N)		
Asthma	32.0 (194)	32.1 (195)
Congestive Heart Failure (CHF)	21.8 (132)	21.3 (129)
Chronic Obstructive Pulmonary Disease (COPD)	22.1 (134)	23.2 (141)
Depression	27.0 (164)	28.8 (175)
Diabetes	37.9 (230)	40.9 (248)
Liver	15.3 (93)	14.3 (87)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD) per beneficiary	$16,406 ($17,793)	$17,089 ($20,821)
Hospitalizations (SD)**	1,819 (2,614)	1,506 (2,183)
ED Visits (SD)	8,521 (10,057)	8,061 (14,315)

NOTE: *p<0.10, **p<0.05, ***p<0.01. §Variable provided by awardee and based on a 12-month review of claims activity. Patients 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 one inpatient admission and six or more ED visits, or 3) 1 inpatient admission and up to five ED visits.

Impact of the PPMC Health Resilience Program. Exhibit PPMC.4 displays the average quarterly and aggregate impact of HRP on its participants relative to the comparison group, across the observed enrollment period.[179] We find the following, relative to the comparison group:

- **Cost:** A reduction in total quarterly cost of care of $408 per HRP beneficiary.
- **Utilization Measures:** No significant decreases in either hospitalizations or ED visits per quarter.[180]

Exhibit PPMC.4: Impact of PPMC Health Resilience Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$408 [-$700; -$115]****
Hospitalizations	-19 [-45, 6]
ED Visits	10 [-21, 42]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$600,854 [-$1,031,802; -$169,906]****

[179] To minimize residual confounding, models are adjusted for age, race, gender, dual eligibility, disability eligibility, CDPS risk score, high utilizer flag, asthma, CHF, COPD, depression, diabetes, and liver disease.

[180] Sensitivity analyses with counts of ED visits suggest that the HRP program is associated with a significant (p<0.01) increase in the number of ED visits per quarter (366 per 1,000 beneficiaries).

AVERAGE QUARTERLY IMPACT[§]	
Hospitalizations	-28 [-66, 9]
ED Visits	15 [-31, 62]

NOTE: * p<0.10, ** p<0.05, *** p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (607), with an average length of program enrollment of 2.4 quarters.

Impact of the PPMC Health Resilience Program in Each Quarter of Enrollment, Community Analysis. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: New Directions Program

Our analysis compares the experiences of Health Share enrollees in the New Directions program with those of a matched group of comparators. We examine the impact of the New Directions program on participants' cost and utilization over the entire enrollment period and in each quarter of program enrollment. Outcome measures are the same as specified above for the Health Resilience Program analysis.

Finder File and Creation of Analytic Sample, New Directions. PPMC provided a data file as described above. We linked this file to Oregon Medicaid Alpha-MAX data to identify 109 unique beneficiaries enrolled in the New Directions program, and further limited this number by enrollment date, Medicaid identifiers, risk scores, and comorbidities to yield an analytic sample of 98 beneficiaries.[181]

Comparison Group, New Directions. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had an ED visit occurring during the same calendar year as New Directions participants (2012-2013), and had at least two additional ED visits or a hospitalization in the prior year. We use propensity score matching without replacement to identify appropriate comparators.[182] The final propensity score model uses age categories; race (White); CDPS risk scores; indicators for dual eligibility, disability eligibility, and status as a high utilizer; medical conditions (affective disorder, depression, psychiatric disorders, hypertension, and diabetes); health care utilization in the prior year (number of hospitalizations and number of ED visits); and total cost of care in the prior year.[183] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, New Directions. Exhibit PPMC.5 displays the descriptive characteristics of beneficiaries in the target and comparison groups. We compare New Directions participants to a

[181] Medicaid claims from the Oregon Medicaid Alpha-MAX are available through September 30, 2013 for this report.

[182] For more information on propensity score matching, please refer to Appendix D.

[183] Our propensity score model did not include chemical dependency, which is a prevalent condition among the New Directions enrollees and would be an important matching variable. NORC's follow-up analyses, to be incorporated in a no-cost extension report, will include this variable in the propensity score matching model.

comparison group with respect to demographics, comorbidities, and prior utilization.[184] The two groups are similar in distribution of age, CDPS risk score, and indicators (flags) for status as a high utilizer and for medical condition. New Directions participants are more likely to be male and African American, less likely to be Hispanic, and more likely to have an ED visit prior to the enrollment period, than are comparators. The average number of hospitalizations and average Medicaid cost of care prior to enrollment are similar between New Directions participants and comparators.

Exhibit PPMC.5: Descriptive Characteristics for PPMC New Directions and Comparison Group Beneficiaries

Variable	New Directions	Comparison
Number of Beneficiaries	98	98
Mean Number of Quarters Enrolled [Range]***	2.4 [1-4]	3.3 [1-4]
Gender % (N)		
Female**	44.9 (44)	62.2 (61)
Age % (N)		
20-29 years	10.2 (10)	6.1 (6)
30-39 years	20.4 (20)	17.4 (17)
40-49 years	30.6 (30)	26.5 (26)
50-59 years*	28.6 (28)	40.8 (40)
≥60 years	10.2 (10)	9.2 (9)
Race/Ethnicity % (N)* **		
White	74.5 (73)	78.6 (77)
Black/African American***	17.4 (17)	3.1 (3)
Hispanic**	3.1 (3)	11.2 (11)
Dual Eligible Status % (N)		
Dually Eligible	9.2 (9)	4.1 (4)
Reason for Medicaid Eligibility		
Disability	72.5 (71)	76.5 (75)
Risk Score		
CDPS Risk Score, Mean (SD)	3.9 (2.1)	4.5 (3.9)
High Utilizer Flag (N)	94.9 (93)	92.9 (91)
Condition % (N)		
Depression	31.6 (31)	26.5 (26)
Psychiatric Conditions	18.4 (18)	18.4 (18)
Hypertension	5.1 (5)	6.1 (6)
Affective Disorders	48.0 (47)	42.9 (42)
Diabetes	33.7 (33)	44.9 (44)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD) per beneficiary	$21,895 ($26,759)	$24,306 ($28,186)
Hospitalizations (SD)	297 (301)	277 (296)
ED Visits (SD)**	1,857 (1,857)	1,534 (1,953)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

[184] We test differences between the groups with a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, gender, disability, eligibility, high utilizer flag, and medical conditions).

Impact of the PPMC New Directions Program. Exhibit PPMC.6 displays the average quarterly and aggregate impact of the New Directions program on its participants relative to the comparison group, across the observed enrollment period.[185] We find the following, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$1,220 per beneficiary).
- **Utilization Measures:** A statistically significant decrease in ED visits per quarter (-162 per 1,000 beneficiaries) but no impact on hospitalizations.[186]

Exhibit PPMC.6: Impact of PPMC New Directions Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$1,220 [-$2,164; -$276]****
Hospitalizations	-51 [-126, 23]
ED Visits	**-162 [-250, -75]*****
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$281,791 [-$499,882; -$63,700]****
Hospitalizations	-12 [-29, 5]
ED Visits	**-38 [-58, -17]*****

NOTE: * p<0.10, ** p<0.05, *** p<0.01. §Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. §§Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (98), with an average length of program enrollment of 2.4 quarters.

Impact of the PPMC New Directions Program in Each Quarter of Enrollment. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: ED Guides Program

Our analysis compares the experiences of Health Share enrollees in the ED Guides program with those of a matched group of comparators. We examine the impact of the ED Guides program on participants' cost and utilization over the entire enrollment period and in each quarter of program enrollment. Outcome measures are the same as specified above.

Finder File and Creation of Analytic Sample, ED Guides. PPMC provided a data file as described above. We linked this file to Oregon Medicaid Alpha-MAX claims to 1,761 unique beneficiaries enrolled in the ED Guides program, and further limited this number by enrollment date, Medicaid identifiers, risk scores, and comorbidities, yielding an analytic sample of 1,503 beneficiaries.[187]

[185] To minimize residual confounding, models are adjusted for age, race, gender, dual eligibility, disability eligibility, CDPS risk score, high utilizer flag, asthma, affective disorder, depression, diabetes, and hypertension.

[186] Sensitivity analyses with counts of ED visits suggest that the New Directions program is associated with a significant (p<0.01) decrease in the number of ED visits per quarter (-897 fewer ED visits per 1000 beneficiaries).

[187] Medicaid claims from the Oregon Medicaid Alpha-MAX are available through September 30, 2013, for this report.

Comparison Group, ED Guides. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had an ED visit occurring during the same calendar year as ED Guides participants (2012-2013), and had at least two additional ED visits or a hospitalization in the prior year. We use propensity score matching without replacement to identify appropriate comparators.[188] The final propensity score model uses age categories; gender; race (White); CDPS risk scores; indicators for dual eligibility and disability eligibility; medical conditions (affective disorder, asthma, depression, diabetes, and hypertension); health care utilization in the prior year (number of hospitalizations and number of ED visits); and total cost of care in the prior year. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, ED Guides. Exhibit PPMC.7 displays the descriptive characteristics of beneficiaries in the target and comparison groups. We compare ED Guides participants to a comparison group with respect to demographics, comorbidities, and prior utilization.[189] ED Guides participants are more likely to be White or African American (and less likely to be Hispanic), and more likely to have an ED visit in the quarter prior to the enrollment period, than are comparators. The two groups are similar in distribution of age, gender, eligibility flags, CDPS risk score, and medical condition flags. The average number of hospitalizations and average Medicaid cost of care prior to enrollment are also similar between ED Guides participants and comparators.

Exhibit PPMC.7: Descriptive Characteristics for PPMC ED Guides and Comparison Group Beneficiaries

Variable	ED Guides	Comparison
Number of Beneficiaries	1,503	1,503
Mean Number of Quarters Enrolled [Range]***	2.2 [1-4]	3.2 [1-4]
Gender % (N)		
Female	62.7 (942)	64.3 (966)
Age % (N)		
<20 years	19.9 (300)	18.4 (277)
20-29 years	26.5 (398)	28.6 (430)
30-39 years	20.8 (312)	21.8 (328)
40-49 years	15.4 (232)	15.2 (229)
50-59 years	13.4 (202)	12.8 (192)
≥60 years	3.9 (59)	3.1 (47)
Race/Ethnicity % (N)* **		
White**	59.8 (899)	55.6 (836)
Black/African American***	20.2 (304)	9.8 (147)
Hispanic***	8.5 (128)	16.2 (244)
Other, Unknown	11.5 (172)	18.4 (276)
Dual Eligible Status % (N)		
Dually Eligible	9.7 (146)	8.6 (129)

[188] For more information on propensity score matching, please refer to Appendix D.

[189] We test differences between the groups with a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, gender, disability, eligibility, high utilizer flag, and medical conditions).

Variable	ED Guides	Comparison
Reason for Medicaid Eligibility		
Disability	29.3 (440)	29.5 (443)
Risk Score		
CDPS Risk Score, Mean (SD)	1.4 (1.1)	1.3 (1.2)
Condition % (N)		
Asthma	14.0 (211)	13.8 (208)
Depression	13.0 (195)	14.2 (214)
Hypertension	0.5 (8)	0.5 (7)
Affective Disorders	21.2 (318)	23.5 (353)
Diabetes	8.8 (132)	8.1 (121)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD) per beneficiary	$8,659 ($13,012)	$8,829 ($13,071)
Hospitalizations (SD)	292 (983)	260 (730)
ED Visits (SD)**	4,215 (7,980)	3,619 (7,710)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of the PPMC ED Guides Program. Exhibit PPMC.8 displays the average quarterly and aggregate impact of the ED Guides program on its participants relative to the comparison group, across the observed enrollment period.[190] We find the following, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$381 per beneficiary).
- **Utilization Measures:** A statistically significant decrease in hospitalizations per quarter (-15 per 1,000 beneficiaries) and ED visits per quarter (-328 per 1,000 beneficiaries). While there is a statistically significant increase in beneficiaries with ED visits per quarter (60 per 1,000 beneficiaries), since the program enrolls its participants in the ED, it is accompanied by a statistically significant decrease in the intensity of ED usage per quarter (-1,100 fewer ED visits).

[190] To minimize residual confounding, models are adjusted for age, race, gender, dual eligibility, disability eligibility, CDPS risk score, asthma, affective disorder, depression, diabetes, and hypertension.

Exhibit PPMC.8: Impact of PPMC ED Guides Program on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$381 [-$516; -$246]*** **
Hospitalizations	**-15 [-24, -6]*** **
Beneficiaries ED Visits	**60 [39, 80]*** **
Number of ED Visits	**-328 [-416, -242]*** **
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$1,273,740 [-$1,725,542; -$821,939]*** **
Hospitalizations	**-51 [-81, -20]*** **
Beneficiaries with ED Visits	**200 [132, 268]*** **
Number of ED Visits	**-1,100 [-1,393, -809]*** **

NOTE: * p<0.10, ** p<0.05, *** p<0.01. **Bolded** fonts indicate where findings reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (1,503), with an average length of program enrollment of 2.2 quarters.

Impact of the PPMC ED Guides Program in Each Quarter of Enrollment. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: Standard Transitions Program

Our analysis compares the experiences of Health Share enrollees in the Standard Transitions program with those of a matched group of comparators. We examine the impact of the Standard Transitions program on participants' cost and utilization over the entire enrollment period and in each quarter of program enrollment. Outcome measures are the same as specified above.

Finder File and Creation of Analytic Sample, Standard Transitions. PPMC provided a data file identifying Standard Transitions program participants and their enrollment dates, as described previously. We linked this file to Oregon Medicaid Alpha-MAX claims to identify 1,017 unique beneficiaries enrolled in the Standard Transitions Program; we further limited this number by enrollment date, Medicaid identifiers, risk scores, and comorbidities, yielding an analytic sample of 309 beneficiaries.[191]

Comparison Group, Standard Transitions. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had a hospital discharge occurring during the same calendar year as Standard Transitions participants (2012-2013), and also had at least two additional ED visits or a hospitalization in the year prior. We use propensity score matching without replacement to identify appropriate comparators.[192] The final propensity score model uses age categories; gender; race (Black); ethnicity (Hispanic); CDPS risk scores; indicators for dual eligibility and disability eligibility; major diagnostic category; health care

[191] Medicaid claims from the Oregon Medicaid Alpha-MAX are available through September 30, 2013, for this report.

[192] For more information on propensity score matching, please refer to Appendix D.

utilization in the prior year (number of hospitalizations and number of ED visits); and total cost of care in the prior year. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, Standard Transitions. Exhibit PPMC.9 displays the descriptive characteristics of beneficiaries in the target and comparison groups. We compare Standard Transitions participants to a comparison group with respect to demographics, comorbidities, and prior utilization.[193] The two groups are similar across most characteristics, although Standard Transitions participants are more likely to have a diagnosis of depression or affective disorder.

Exhibit PPMC.9: Descriptive Characteristics for PPMC Standard Transitions and Comparison Group Beneficiaries

Variable	Standard Transitions	Comparison
Number of Beneficiaries	309	309
Mean Number of Quarters Enrolled [Range]***	1.7 [1-3]	2.5 [1-3]
Gender % (N)		
Female	57.3 (177)	54.7 (169)
Age % (N)		
20-29 years	6.8 (21)	5.8 (18)
30-39 years	7.1 (22)	8.4 (26)
40-49 years	21.0 (65)	18.5 (57)
50-59 years	32.4 (100)	33.0 (102)
≥60 years	32.4 (100)	33.0 (102)
Race/Ethnicity % (N)		
White	63.1 (195)	67.3 (208)
Black/African American	24.3 (75)	22.0 (68)
Hispanic	4.5 (14)	4.2 (13)
Dual Eligible Status % (N)		
Dually Eligible	27.8 (86)	30.7 (95)
Reason for Medicaid Eligibility		
Disability	59.6 (184)	64.4 (199)
Risk Score		
CDPS Risk Score, Mean (SD)	3.6 (2.2)	3.7 (2.4)
High Utilizer Flag (N)	95.2 (294)	95.5 (295)
Condition % (N)		
Asthma	23.0 (71)	17.8 (55)
Depression**	20.4 (63)	14.2 (44)
Diabetes	39.2 (121)	36.6 (113)
Affective Disorder**	30.1 (93)	22.3 (69)
Discharge Destination % (N)		
Discharge to Home	84.5 (261)	77.4 (239)

[193] We test differences between the groups with a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, gender, disability, eligibility, discharge flag, high utilizer flag, and medical conditions).

Variable	Standard Transitions	Comparison
Mean Utilization and Cost in Quarter Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD) per beneficiary	$17,154 ($16,841)	$18,607 ($22,461)
Hospitalizations (SD)	2,155 (1,916)	2,074 (2,192)
ED Visits (SD)	3,844 (6,385)	4,071 (7,610)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of the PPMC Standard Transitions Intervention. Exhibit PPMC.10 presents the average quarterly and aggregate impact of the Standard Transitions intervention on its participants relative to the comparison group across the observed enrollment period.[194] We find the following, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$1,081 per beneficiary).
- **Utilization Measures:** A significant increase in ED visits per quarter (154 per 1,000 beneficiaries) and no clear trend for hospitalizations.[195]

Exhibit PPMC.10: Impact of PPMC Standard Transitions Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$1,081 [-$1,495; -$667]*** **
Hospitalizations	1 [-93, 95]
ED Visits	**154 [100, 208]*** **
AGGREGATE IMPACT§§	
Outcome Measure	**Impact (Adjusted Estimate) [90% Confidence Interval]**
Total Cost of Care ($)	**-$578,241 [-$799,802; -$356,680]*** **
Hospitalizations	1 [-50, 51]
ED Visits	**82 [54, 111]*** **

NOTE: * p<0.10, ** p<0.05, *** p<0.01. **Bolded** fonts indicate where results reach statistical significance. §Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. §§Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (309), with an average length of program enrollment of 1.7 quarters.

Impact of the PPMC Standard Transitions Program in Each Quarter of Enrollment. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: Care Transitions Program

Our analysis compares the experiences of Health Share enrollees in the Care Transitions (C-TRAIN) arm of the intervention with those of a matched group of comparators. We examine the impact of C-TRAIN

[194] To minimize residual confounding, we adjust models for age, race, gender, dual eligibility, disability eligibility, CDPS risk score, high utilizer indicator, discharge location indicator, asthma, depression, and diabetes.

[195] Sensitivity analyses with counts of ED visits suggest that the program is not associated with any significant decreases in number of ED visits for its participants.

on participants' cost and utilization over the entire enrollment period and in each quarter of program enrollment. Outcome measures are the same as specified above.

Finder File and Creation of Analytic Sample, Care Transitions. PPMC provided a data file identifying C-TRAIN program participants and their enrollment dates, as described above. We linked this file to Oregon Alpha-MAX claims to identify 387 unique beneficiaries enrolled in C-TRAIN; we further limited this number by enrollment date, Medicaid identifiers, risk scores, and comorbidities to yield an analytic sample of 226 beneficiaries.[196]

Comparison Group, Care Transitions. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had a hospital discharge occurring during the same calendar time period as C-TRAIN participants (2012-2013), and also had at least two additional ED visits or a hospitalization in the year prior. We use propensity score matching without replacement to identify appropriate comparators.[197] The final propensity score model uses age categories, gender, Black race, Hispanic ethnicity, CDPS risk scores, dually eligible indicator, disability eligibility indicator, high utilizer indicator, Major Diagnostic Category, health care utilization in the prior year (number of hospitalizations and number of ED visits), and total cost of care in the prior year. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, Care Transitions. Exhibit PPMC.11 displays the descriptive characteristics of beneficiaries in the target and comparison groups. We compare C-TRAIN participants to a comparison group with respect to demographics, comorbidities, and prior utilization.[198] C-TRAIN participants are more likely to be between 40 and 60 years of age, and less likely to be over 60 years of age, than are comparators, and are more likely to have a diagnosis of asthma, depression, or affective disorder. The two groups are similar across other characteristics, including ethnicity, gender, health status, and utilization and health care costs prior to the enrollment period.

Exhibit PPMC.11: Descriptive Characteristics for PPMC C-TRAIN and Comparison Group Beneficiaries

Variable	PPMC C-TRAIN	Comparison
Number of Beneficiaries	226	226
Mean Number of Quarters Enrolled [Range]***	2.0 [1-3]	2.4 [1-3]
Gender % (N)		
Female	51.3 (116)	54.4 (123)

[196] Medicaid claims from the Oregon Medicaid Alpha-MAX are available through September 30, 2013 for this report.

[197] For more information on propensity score matching, please refer to Appendix D.

[198] Differences between the groups are tested using a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, gender, disability, eligibility, discharge flag, high utilizer flag and medical conditions)

Variable	PPMC C-TRAIN	Comparison
Age % (N)*		
20-29 years	5.8 (13)	6.2 (14)
30-39 years*	6.2 (14)	10.6 (24)
40-49 years**	22.1 (50)	13.7 (31)
50-59 years	37.6 (85)	31.9 (72)
>60 years**	27.0 (61)	36.3 (82)
Race/Ethnicity % (N)		
White	66.8 (151)	67.3 (152)
Black/African American	20.8 (47)	21.7 (49)
Hispanic	4.0 (9)	3.1 (7)
Dual Eligible Status % (N)		
Dually Eligible	19.9 (45)	21.7 (49)
Reason for Medicaid Eligibility		
Disability	65.0 (147)	62.4 (141)
Risk Score		
CDPS Risk Score, Mean (SD)	3.6 (2.0)	3.7 (2.4)
High Utilizer Flag (N)	96.0 (217)	95.1 (215)
Condition % (N)		
Asthma*	25.2 (57)	18.6 (42)
Depression***	20.4 (46)	10.6 (24)
Diabetes	40.3 (91)	39.8 (90)
Affective Disorder***	32.7 (74)	18.6 (42)
Discharge Destination % (N)		
Discharge to Home	82.3 (186)	82.3 (186)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost per beneficiary (SD)	$16,663 ($30,172)	$15,407 ($14,969)
Hospitalizations (SD)	2,412 (2,563)	2,124 (2,138)
ED Visits (SD)	4,580 (6,340)	4,686 (7,967)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of the PPMC C-TRAIN Program. Exhibit PPMC.12 displays the average quarterly and aggregate impact of C-TRAIN on its participants relative to the comparison group, across the observed enrollment period.[199] We find the following, relative to the comparison group:

- **Cost:** A reduction in total quarterly cost of care (-$681 per beneficiary).
- **Utilization Measures:** No significant decreases in either hospitalizations or ED visits per quarter.[200]

[199] To minimize residual confounding, models are adjusted for age, race, gender, dual eligibility, disability eligibility, CDPS risk score, high utilizer indicator, discharge location indicator, asthma, depression, and diabetes.

[200] Sensitivity analyses with counts of ED visits, suggest that the C-TRAIN program is not associated with any significant decreases in number of ED visits for its participants.

Exhibit PPMC.12: Impact of PPMC C-TRAIN on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$681 [-$1,061; -$302]*** **
Hospitalizations	-52 [-153, 50]
ED Visits	39 [-19, 97]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$305,968 [-$476,458; -$135,479]*** **
Hospitalizations	-23 [-69, 22]
ED Visits	18 [-9, 44]

NOTE: * p<0.10, ** p<0.05, *** p<0.01. **Bolded** fonts indicate where results reach statistical significance. §Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (226), with an average length of program enrollment of 2 quarters.

Impact of the PPMC Care Transitions (C-TRAIN) Program in Each Quarter of Enrollment. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core Measures: Intensive Transition Teams Program

Our analysis compares the descriptive characteristics of Health Share enrollees in the Intensive Transitions Teams Program (ITT) with those of a matched group of comparators. Our findings are limited to comparison of descriptive characteristics between ITT and comparison group members, because the small number of beneficiaries with claims related to a psychiatric condition precludes further analysis at this time. We plan to present analyses on ITT's impact on utilization and in the forthcoming no-cost addendum report, using Alpha-MAX claims that capture the entire period of performance of the ITT program.

Finder File and Creation of Analytic Sample, ITT. PPMC provided a data file with ITT program participants and their enrollment dates. We linked this file to Oregon Alpha-MAX claims to calculate outcome measures for the ITT participants.[201] The file identified 190 unique beneficiaries enrolled in the ITT Program. We further limited this number by enrollment date; Medicaid identifiers; membership in a diagnosis-related group (DRG) for mental disease or disorder (major diagnostic category 19); risk scores; and comorbidities to yield an analytic sample of 33 beneficiaries.

Comparison Group and Matching, ITT. The comparison pool consists of beneficiaries who were enrolled in Oregon Medicaid during the same time period, as identified from Alpha-MAX claims. These beneficiaries had a hospital discharge occurring during the same calendar time period as ITT participants (2012-2013), and also had at least two additional ED visits or a hospitalization in the year prior. We use propensity score matching without replacement to identify appropriate comparators.[202] The final

[201] Medicaid claims from the Oregon Medicaid Alpha-MAX are available through September 30, 2013, for this report.

[202] For more information on propensity score matching, please refer to Appendix D.

propensity score model uses age; gender; race (White); CDPS risk score; indicators for dual eligibility; disability eligibility and status as a high utilizer; DRG; health care utilization in the prior year (number of hospitalizations and number of ED visits); and total cost of care in the prior year. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics, ITT. Exhibit PPMC.13 displays the descriptive characteristics of beneficiaries in the target and comparison groups. We compare ITT participants to a comparison group with respect to demographics, comorbidities, and prior utilization.[203] The two groups are similar across all measured covariates. The majority of the treatment group has a DRG related to psychoses, although other psychiatric comorbidities are found among that same group. Four of five beneficiaries are White, over half are female, and almost three-quarters are age 30 to 50 years. Compared to the awardee's other programs analyzed in this chapter, the utilization and cost measures for ITT beneficiaries are relatively low.

Exhibit PPMC.13: Descriptive Characteristics for PPMC ITT Participants and Comparison Group Beneficiaries

Variable	Intensive Transition Teams	Comparison
Number of Beneficiaries	33	33
Mean Number of Quarters Enrolled [Range]	2.5 [1-3]	2.7 [1-3]
Gender % (N)		
Female	57.6 (19)	48.5 (16)
Age % (N)		
20-29 years	12.1 (4)	18.2 (6)
30-39 years	36.4 (12)	30.3 (10)
40-49 years	36.4 (12)	24.2 (8)
50-59 years	15.2 (5)	18.2 (6)
Race/Ethnicity % (N)		
White*	84.8 (28)	97.0 (32)
Dual Eligible Status % (N)		
Dually Eligible	15.2 (5)	30.3 (10)
Reason for Medicaid Eligibility		
Disability	60.6 (20)	66.7 (22)
Risk Score		
CDPS Risk Score, Mean (SD)	2.8 (1.7)	2.6 (1.7)
High Utilizer Flag (N)	33.3 (11)	24.2 (8)
Condition % (N)		
Affective Disorder	78.8 (26)	66.7 (22)
Depression	60.6 (20)	45.5 (15)
Psychiatric Conditions	39.4 (13)	39.4 (13)
Non-Organic Psychoses	36.4 (12)	51.5 (17)

[203] We test differences between the groups with a t-test for continuous measures (age, CDPS risk score and utilization in the year prior to the index date) or a chi-square test for categorical variables (race, gender, disability, eligibility, discharge flag, high utilizer flag, and medical conditions).

Variable	Intensive Transition Teams	Comparison
Mean Utilization and Cost in Quarter Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD) per beneficiary	$13,311 ($12,383)	$12,873 ($9,589)
Hospitalizations (SD)	2,970 (3,405)	3,152 (3,012)
ED Visits (SD)	8,485 (10,625)	9,121 (11,781)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Workforce Development

Staffing. The Health Commons initiative includes a diverse workforce with an emphasis on non-clinical roles, including social workers, peer counselors, case managers, health behavior specialists, and health resilience specialists (HRSs). Notably, the program also supports a 15-member internal evaluation team at the Center for Outcomes Research and Evaluation (CORE). The awardee hired a large number of new staff across its constituent organizations to carry out the nine intervention components that make up the program. With the creation of several new roles working with a challenging population—especially the HRS role—program leadership focused on hiring staff with the right skills and experience to be successful. The HRS role has continued to evolve since the inception of the program. While the pilot program relied on peer health workers with general experience in building trust and rapport with patients, further experience in the field revealed that many of the problems afflicting the patient population (homelessness, addiction, mental health problems, and trauma) required staff with higher levels of experience and expertise.

> "[Other] agencies…had an understanding of trauma-informed care, [but] it did not impact the way they delivered care…Being here, however, not only is there emphasis on it, but there is understanding from the highest levels that it is how we practice, how we do our work, and is part of what we do."
> –Health Resilience Specialist

Training. Health Commons' leaders note that they have had very little staff turnover, which they attribute to a few reasons. First, they offer competitive salaries. Second, they provide staff with trauma stewardship training, which helps staff develop skills and tools to handle the stressful situations they encounter, in addition to trauma-informed care training (TIC). TIC, developed by the federal Substance Abuse and Mental Health Services Administration (SAMHSA),[204] emphasizes the importance of patient-centered care for individuals who have experienced traumatic experiences and focuses on building trust with patients based on mutual respect and collaboration. Last, the program ensures that supervisors are available to support staff members, who know that they can take time off when they need to. Health Commons administers a two-week classroom-based training at Care Oregon, after which new-hires participate in clinical shadowing opportunities that focus on policies and procedures within each clinic. The training period has been modified over time, since, as the leadership team pointed out, the clinics have such unique cultures that developing a curriculum that can be applied to all of them is hard. Although training at first lasted around two months, it has since been reduced to two weeks. Major components include the Capacitation Center Community Outreach Worker program, LEAN training, motivational interviewing, and disease-specific content, as well as classes on specific intervention components.

[204] Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services. Trauma-Informed Approach and Trauma-Specific Interventions. Retrieved July 18, 2016 from https://www.samhsa.gov/nctic/trauma-interventions.

Implications for Workforce. As reported in NORC's Second Annual Report, a survey of workforce found that a majority of respondents (38 percent) have a positive view of Health Commons program trainings and consider PopIntel, TIC, trauma stewardship, and team-wide discussions to be the most useful. Respondents feel that trainings are worth the time invested, teach useful skills, and prepare them for various aspects of their jobs. While Health Commons' staff members report moderate to high levels of stress, they also report experiencing the work as rewarding. Staff reports that teamwork has a positive effect on the quality of care and clinical decision making. Respondents also feel they receive good feedback and support from their supervisors. Overall, Health Commons' 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.

Context: Health Commons in its Third Year

The Health Commons intervention grew out of a unique policy environment, where normally competitive health plans and health systems came together to form a regional system of care that became the CCO Health Share. Not only were these organizations willing to collaborate and share resources, but counties and community partners joined forces around a common mission: to serve a high-risk population with substantial mental health and substance abuse needs. This awardee had strong community and organizational buy-in and the right incentives, due to the reformation of Medicaid into regional CCOs, along with a sunset provision for Medicaid managed care organizations (MCOs) in place for 2017, which allowed them to be ambitious in the interventions' scope and reach.

Part of this awardee's success is also due to its ability to pull resources, many of which were in place before the start of the HCIA award, from organizational partners. PopIntel, a case management data collection software, was developed by CareOregon and then adapted and enhanced during the HCIA intervention period to fulfill a robust population management, patient tracking, and care coordination needs. PopIntel allows team members to track intervention encounters (calls, meetings, etc.); enrollment information; and claims data that are then summarized into a "Health Services Profile" snapshot view of the participant. The software automatically notifies providers when a Health Commons participant comes into the ED by matching up ED records with registry lists in the PopIntel system. This software improves Health Commons' ability to coordinate the care of its high-risk patient population.

Sustaining, Replicating, and Scaling Health Commons

As we noted in NORC's Second Annual Report to CMMI (2016), organization partners will sustain Health Commons' intervention components after the end of HCIA funding. The aims of the HCIA intervention, and those of the CCO Health Share and its organizational partners as part of the new Medicaid health care delivery system model in Oregon, have remained aligned as the CCO matured. 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. Yet, there are strong opportunities to replicate the intervention in other CCOs within Oregon. One leader at PPMC, part of the five-state hospital system Providence Health & Services, mentioned that its 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.

Summary

Preliminary analyses of program impacts for PPMC's interventions using Oregon Alpha-MAX claims showed that all five interventions demonstrated some level of statistically significant cost savings. The New Directions and ED Guides also showed significant reduction in ED utilization across the four post-intervention quarters associated with this report.

Three caveats limit the confidence of our analyses: First, the impacts presented in this report using Alpha-MAX claims are preliminary and limited at best to four quarters of the program. For certain programs like ITT, we were unable to report findings of program impacts due to limited claims. Second, our propensity score models for HRP and New Directions programs did not include psychiatric disorders and chemical dependency. These conditions are common among the HRP and New Directions patient populations and would be important matching variables for selecting similar comparators. NORC's follow-up analyses, to be incorporated in a no-cost extension report, will include these variables when selecting the comparison groups for these two programs. Relatedly, there is likely to be confounding by other unmeasured variables, for example, related to social determinants of health, which are part of inclusion criteria for enrollment but are not noted in claims for comparators. Hence, reported program effectiveness estimates are likely to be conservative. Finally, sample sizes are smaller than those in analyses in previous NORC reports to CMMI, reflecting the use of Alpha-MAX data and its limited time period of Medicaid claims to assess the full impact of PPMC's interventions on Medicaid beneficiaries. We propose measuring the impact of PPMC's interventions over their entire period of performance, by using more up-to-date Alpha-MAX claims in the forthcoming no-cost extension report.

References

HCIA Narrative Progress Report for Providence Portland Medical Center, for Reporting Quarter End Date 9/30/2015. Submitted by PPMC, 10/30/2015.

HCIA Quarterly Report for PPMC, for Reporting Quarter End Date 9/30/2015. Submitted by PPMC, 12/09/2015.

St. Francis Healthcare Foundation of Hawaii

Home Outreach Program & E-Health (H.O.P.E.). Telehealth monitoring for high-risk beneficiaries living independently who have chronic heart failure (CHF); acute myocardial infarction (AMI); chronic obstructive pulmonary disease (COPD); and/or end-stage renal disease (ESRD). There are two intervention arms: one for patients whose condition may be unstable at time of hospital discharge, for whom telemonitoring is provided for 30 days post hospitalization (hospital); and the other for high-risk patients living at home, who participate in telemonitoring for one year (community).

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Chronic Disease Self-Management, Clinician Decision Supports, Home Health/Home Care, Rural Health

LOCATION: Hawaii
GRANT: $5,299,706
AWARD DATES: 11/27/12 to 6/30/16
NO-COST EXTENSION: 12 month, full program
PAYER(S): Medicare, Medicaid

REACH: 1,803 beneficiaries (84% of target)
POPULATIONS: Adults, Rural, Chronic Conditions
DATA: Medicare claims (10/12-3/16); one site visit (3/14); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Program faced challenges recruiting patients due to misalignment of algorithm with target population, closure of a site and patients who did not meet eligibility criteria.
- Over implementation period, it shifted to greater reliance on provider referrals to recruit enrollees.

WORKFORCE

- Telehealth nurses train patients to conduct daily measurements, which are monitored remotely.
- Some staff turnover during the project was due to non-competitive salaries.

CONTEXT

- Challenges recruiting patients due to misalignment of algorithm with target population, closure of a site and patients who did not meet eligibility criteria.
- Program ended up relying on provider referrals to recruit patients.

OUTCOMES§

COST

- Findings not statistically significant. One-year telemonitoring arm shows promising trend in decreased cost for the time period participants remain enrolled in the program (less than one year)

UTILIZATION

- Findings not statistically significant

Analysis limited due to small sample sizes.

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

The H.O.P.E. program is being taken over by the Hawaii Medical Service Association (HMSA), the largest insurer in the state of Hawaii. HMSA is retaining the operations and staff that had been employed in the intervention.

REPLICABILITY & SCALING

There are no current plans to scale the intervention.

§Outcomes for cost and utilization are from analyses that include a comparison group and are statistically significant at the $p<0.10$ level. Outcomes for quality of care are from NORC focus groups and interviews.

Overview of Project H.O.P.E.

Background. Home Outreach Program & E-Health (H.O.P.E.) grew out of a randomized clinical trial (RCT) pilot that the awardee leadership conducted with high-risk end-stage renal disease (ESRD) patients over several years, under the auspices of the St. Francis Healthcare Foundation and funded by the United States Medical and Material Command. The distances between communities and remote locations in Hawaii make telehealth interventions particularly attractive as a way to bring services and clinical oversight to isolated, underserved patients and their family caregivers. The health insurance and health plan market in Hawaii is dominated, across all islands, by the Hawaii Medical Service Association (HMSA), which has roughly 500,000 subscribers in employment-based plans; 50,000 in a Medicare Advantage program; and 110,000 Hawaii residents in a state Medicaid managed care plan. HMSA supports H.O.P.E. by producing and sharing lists of high-risk, high-utilizing members and their primary care physicians with the HCIA awardee.

H.O.P.E. has two intervention arms: The first recruits participants prior to hospital discharge for telemonitoring with daily clinical measurements and a stable transition to home. The second arm enrolls participants referred from the community—typically by their primary care provider (PCP)—for telemonitoring over the course of a year. This longer intervention emphasizes changing participant behavior to improve the self-management of chronic conditions. The goal of the first intervention is to reduce 30-day readmission rates and the latter to reduce hospitalization rates over the course of the year. 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. 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 plans. Patients are also asked to answer a brief health self-assessment questionnaire specific to their health condition.

Goals. In addition to the CMMI core performance measures, project H.O.P.E. focuses on improving health outcomes related to disease self-management and quality of life.

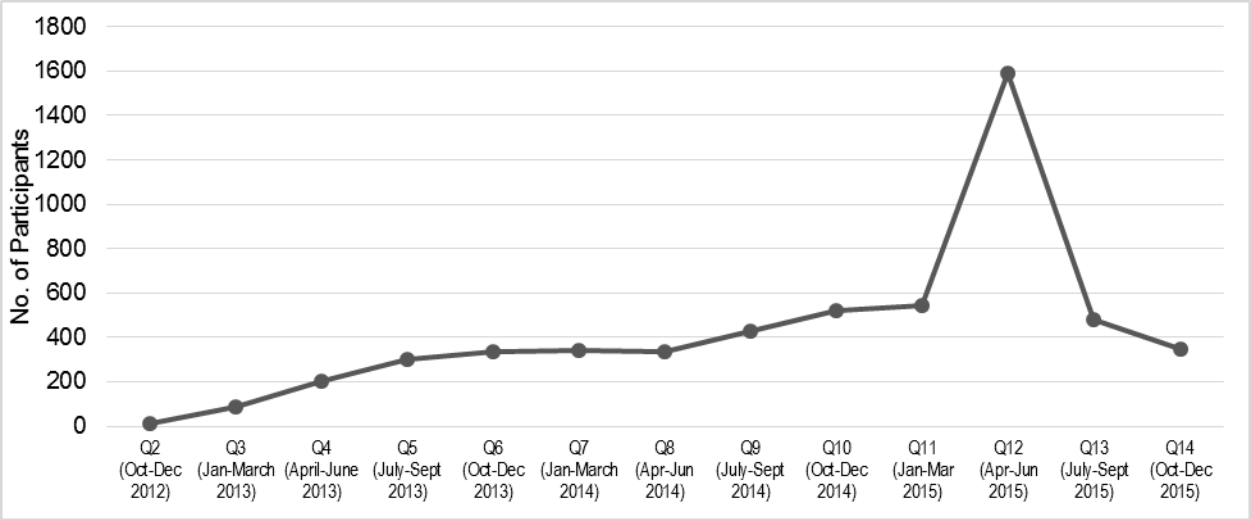
Program Models. Project H.O.P.E. uses telemonitoring of select conditions—congestive heart failure (CHF); acute myocardial infarction (AMI); chronic obstructive pulmonary disease (COPD); and ESRD. A nurse remotely monitors participants' daily health measurements, initiates patient contact, and facilitates follow-up appointments when needed.

Implementation Updates. Since NORC's Second Annual Report to CMMI (2016), H.O.P.E. has slowed patient recruitment as HCIA funding during the NCE period came to a close and it sought sustainability funding from partner organizations. HMSA will take over the program, and patient recruitment is expected to increase.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 30, 2015, Project H.O.P.E. had served a cumulative total of 1,803 unique direct participants since program launch. Enrollment in H.O.P.E. rose steadily through its first 12 months (through July 2013), and then remained

steady through 2014 before declining in 2015 (see Exhibit HOPE.1).[205] During the most recent quarter for which data are available, the program served 346 unique participants. About one-quarter of the participants are 26-64 years old (23 percent) and one-third have an unknown age (36 percent). Fifty six percent are male. Most participants are identified as Asian (37 percent) or two or more races/ethnicities (28 percent).

Exhibit HOPE.1: Total Number of H.O.P.E. Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

The H.O.P.E. Program's post-acute care (hospital) arm and the one-year telemonitoring program are not associated with meaningful changes in cost, utilization, or quality of care outcomes. The one-year telemonitoring arm shows promising trend in decreased cost for the time period in which program participants receive the program (less than one year). In the section below, we present our analyses of program effectiveness, based on two types of data: Medicare Fee-For-Service (FFS) claims and narrative from NORC interviews and one site visit.

Core and Supplemental Measures: Hospital Arm

Our hospital analysis compares the experiences of H.O.P.E. enrollees in the 30-day post-acute care arm of the intervention with those of a weighted comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's H.O.P.E. program over the implementation period as a whole and in each quarter of program implementation. Our analysis is for Medicare FFS beneficiaries, comprising 34 percent of all H.O.P.E. enrollees.[206]

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day Total Cost of Care per beneficiary-episode
- 90-day Hospitalizations
- 90-day Emergency Department Visits
- 30-day Readmissions
- 7-day Practitioner Follow-up Visits
- 30-day Practitioner Follow-up Visits

[205] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent St. Francis self-reported data available for NORC's AR3 is for HCIA reporting quarter 14, for the time period October 1 through December 31, 2015.

[206] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

Finder File and Creation of Analytic Sample, Hospital Arm. St. Francis provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[207] We identified 340 unique beneficiary-episodes, and further limited this number by enrollment date, Medicare identifiers, admission date, discharge date, and whether the episode was an inpatient claim (to better align with our comparison group, which is identified based on inpatient claims), to yield an analytic sample of 145 beneficiary-episodes.

Comparison Group, Hospital Arm. 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.[208] We also use claims-based rules to identify an external comparison group, comprising similar Medicare beneficiary-episodes discharged from two comparison hospitals in Hawaii, during the pre- and post-intervention periods.[209] We use propensity score weighting (standardized mortality ratio weights) to minimize observed differences in beneficiary-episode characteristics between the St. Francis treatment and comparison groups. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[210]

Descriptive Characteristics, Hospital Arm. Exhibit HOPE.2 displays the descriptive characteristics of beneficiary-episodes (discharges) for the treatment and comparison groups before and after implementation of the intervention, prior to propensity score weighting. We compare the two groups with respect to demographics, comorbidities, and prior utilization.[211] Beneficiary-episodes attributed to the H.O.P.E. hospital arm are younger and more likely to be dual eligible and have more comorbidities. There are no significant differences in gender, race/ethnicity, original Medicare coverage reason, and utilization or cost in the year prior to enrollment.

[207] Medicare claims are available for the time period from October 1, 2012 through March 31, 2016, for this report. We use September 30, 2015 as the cut-off date for hospital discharges, with a 90 day episode period ending December 31, 2015. Claims through Mar 31, 2016 are used to allow for claims run off.

[208] We identify Medicare beneficiary-episodes discharged from H.O.P.E. hospitals during the pre-intervention period, which met the inclusion criteria for the 30-day post-acute program, as part of the pre-intervention group. We only include beneficiaries that had a short-term inpatient stay at the treatment/comparison hospitals and who were discharged alive. We excluded beneficiaries admitted to the hospitals and transferred to another inpatient facility from our analysis.

[209] Kona Community Hospital and Kaiser Foundation Hospital were selected as the comparison hospitals for Hilo Medical Center and Queen's Medical Center West, respectively.

[210] For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

[211] We tested differences between the groups with 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).

Exhibit HOPE.2: Descriptive Characteristics for H.O.P.E. Hospital Arm and Comparison Group Beneficiary-Episodes

Variable	Pre-Intervention Period		Post-Intervention Period	
	St. Francis	Comparison	St. Francis	Comparison
Number of Beneficiary-Episodes	**410**	**248**	**145**	**386**
Gender % (N)				
Female	45.6 (187)	42.3 (105)	49.0 (71)	46.1 (178)
Age Group % (N) ***				
<70 years	26.1 (107)	35.9 (89)	33.8 (49)	35.5 (137)
70-74 years	17.3 (71)	20.2 (50)	16.6 (24)	12.2 (47)
75-79 years	13.7 (56)	9.7 (24)	18.6 (27)	14.5 (56)
80-84 years	15.4 (63)	8.5 (21)	17.2 (25)	11.7 (45)
≥85 years	27.6 (113)	25.8 (64)	13.8 (20)	26.2 (101)
Race/Ethnicity % (N)				
White	39.3 (161)	56.5 (140)	39.3 (57)	45.6 (176)
Asian	1.5 (6)	0.8 (2)	0.7 (1)	1.0 (4)
Other	56.3 (231)	42.3 (105)	59.3 (86)	52.8 (204)
Dual Eligibility % (N) ***				
Dual Enrolled	37.6 (154)	34.3 (85)	35.2 (51)	22.5 (87)
Coverage Reason % (N)				
Age	74.6 (306)	68.1 (169)	69.7 (101)	75.4 (291)
Disability	21.0 (86)	25.8 (64)	26.9 (39)	19.4 (75)
ESRD	0.7 (3)	2.0 (5)	2.8 (4)	3.1 (12)
Disability and ESRD	3.7 (15)	4.0 (10)	0.7 (1)	2.1 (8)
Hierarchical Chronic Conditions (HCC)				
Mean HCC Score (Standard Deviation)	2.8 (1.5)	2.7 (1.5)	3.0 (1.6)	2.8 (1.6)
Mean Count of HCCs (SD) *	4.5 (2.6)	4.5 (3.0)	5.0 (2.7)	4.5 (2.8)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes, unless noted)				
Total Medicare Cost (SD) per beneficiary-episode ($)	$26,675 ($35,783)	$30,858 ($46,208)	$27,333 ($38,028)	$24,024 ($33,893)
Hospitalizations (SD)	1,042(1,447)	1,186 (1,792)	972.4 (1,241)	1,054 (1571)
ED Visits (SD)	1,388 (2,450)	1,133 (2,596)	1,490 (2,320)	1,231 (2,080)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of H.O.P.E. Program, Hospital Arm. Exhibit HOPE.3 presents the average quarterly and aggregate impact of the H.O.P.E. innovation on its participants relative to the comparison group. We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary-episode.[212] We find the following, relative to the comparison group:

- **Cost:** A non-significant increase in 90-day total quarterly cost of care.
- **Utilization Measures:** A small, non-significant decrease in hospitalizations per quarter and non-significant increases in ED visits and readmissions per quarter.
- **Quality of Care Measures:** Non-significant increases in both 7-day and 30-day practitioner follow-up visits per quarter.

[212] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit HOPE.3: Impact of H.O.P.E. Program on Outcomes, Hospital Arm

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
90-day Total Cost of Care per Beneficiary-episode ($)	$805 [-$5,651; $7,261]
90-Day Hospitalizations	-16 [-106, 74]
90-Day ED Visits	54 [-43, 151]
30-Day Readmissions	4 [-64, 72]
7-Day Practitioner Follow-up Visits	92 [-15, 199]
30-Day Practitioner Follow-up Visits	26 [-73, 125]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$116,725 [-$819,387; $1,052,837]
90-Day Hospitalizations	-2 [-15, 11]
90-Day ED Visits	7 [-6, 20]
30-Day Readmissions	1 [-9, 11]
7-Day Practitioner Follow-up Visits	13 [-3, 29]
30-Day Practitioner Follow-up Visits	4 [-10, 18]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of beneficiary-episodes (145) and total length of program implementation included in analysis (eleven quarters).

Impact of H.O.P.E. Program in Each Quarter of Enrollment, Hospital Arm. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core and Supplemental Measures: Community Arm

Our community (ambulatory care) analysis compares the experience of St. Francis enrollees in the one-year community telemonitoring program with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's H.O.P.E. innovation over the enrollment period as a whole and in each quarter of enrollment. Our analysis is for Medicare FFS beneficiaries, comprising 34 percent of all H.O.P.E. enrollees.[213]

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department Visits
- 30-day Readmissions
- Ambulatory Care-Sensitive (ACS)

Finder File and Creation of Analytic Sample, Community Arm. 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.[214] We identified 480 unique beneficiaries and further limited this number by

[213] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[214] Medicare claims are available through March 31, 2016 for the analysis in this report. We use December 31, 2015 as the cut-off date to account for the 90-day claims runoff

enrollment date, Medicare identifiers, and chronic conditions, yielding an analytic sample of 252 beneficiaries.

Comparison Group, Community Arm. The comparison pool consists of non-institutionalized Medicare FFS patients in the same zip codes in Hawaii as the H.O.P.E. program participants. We use propensity score matching to find appropriate comparators.[215] The final propensity model includes age, race, gender, disability status, HCC score, and prior-year utilization (ED visits and hospitalizations) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[216]

Descriptive Characteristics, Community Arm. Exhibit HOPE.4 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, comorbidities, and prior utilization.[217] We observe no differences in demographics, comorbidities, or prior utilization measures.

Exhibit HOPE.4: Descriptive Characteristics for H.O.P.E. Community Arm and Comparison Group Beneficiaries

Variable	St. Francis	Comparison
Number of Persons	252	252
Mean Number of Quarters Enrolled [Range]	3.7 [1 - 9]	3.7 [1 - 9]
Gender % (N)		
Female	48.8 (123)	48.4 (122)
Age Group % (N)		
<70 years	26.2 (66)	25.8 (65)
70-74 years	13.9 (35)	15.5 (39)
75-79 years	18.3 (46)	15.5 (39)
80-84 years	18.3 (46)	19.4 (49)
≥85 years	23.4 (59)	23.8 (60)
Race/Ethnicity % (N)		
White	28.2 (71)	30.6 (77)
Asian	31.3 (79)	30.2 (76)
Other	40.5 (102)	39.3 (99)
Dual Eligibility % (N)		
Dual Enrolled	20.2 (51)	20.2 (51)
Coverage Reason % (N)		
Age	75.4 (190)	73.4 (185)
Disability	17.9 (45)	20.6 (52)
ESRD	2.8 (7)	3.2 (8)
Disability and ESRD	4.0 (10)	2.8 (7)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (SD)	3.3 (1.6)	3.3 (1.7)
Mean Count of HCCs (SD)	5.5 (2.8)	5.3 (2.8)

[215] For more information on propensity score matching, please refer to Appendix C.

[216] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[217] We tested differences between these groups with 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).

Variable	St. Francis	Comparison
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost (SD; $)	$38,621 ($38,107)	$36,954 ($36,315)
Hospitalizations (SD)	1,654.8 (1,337.4)	1,694.4 (1,032.3)
ED Visits (SD)	1,464.3 (2,190.8)	1,400.8 (2,026.2)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of H.O.P.E. Program, Community Arm. Exhibit HOPE.5 displays the average quarterly and aggregate impact of the H.O.P.E. innovation on its participants relative to the comparison group.[218] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[219] We find the following for the H.O.P.E. program, relative to the comparison group:

- **Cost:** A non-significant decrease in total cost of care.
- **Utilization Measures:** Non-significant increases in hospitalizations, ED visits, and 30-day readmissions.
- **Quality of Care:** A small non-significant decrease in ambulatory care-sensitive hospitalizations.

Exhibit HOPE.5: Impact of H.O.P.E. Program on Outcomes, Community Arm

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	-$861 [-$2,239; $517]
Hospitalizations	25 [-11, 61]
ED Visits	10 [-32, 52]
30-Day Readmissions	5 [-76, 86]
ACS Hospitalizations	-2 [-27, 23]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	-$793,601 [-$2,064,110; $476,908]
Hospitalizations	23 [-10, 56]
ED Visits	9 [-30, 48]
30-Day Readmissions	1 [-16, 18]
ACS Hospitalizations	-2 [-24, 20]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (252), with an average length of program enrollment of 3.7 quarters, ranging from 1-9 quarters.

Impact of H.O.P.E. Program in Each Quarter of Enrollment, Community Arm. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

[218] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, dual eligibility indicator, HCC score, and disability indicator.

[219] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Workforce Development

Staffing. H.O.P.E. expands the role of nurse clinicians in monitoring patient condition and coordinating care post-discharge in the 30-day program, and in using home-based telemonitoring to promote self-management for adults with complex medical conditions who are at high risk for hospitalization in the one-year prevention program. There has been some turnover among telehealth nurses recruited to the program. Although the pool of RNs on Oahu eligible for the telemonitoring positions was relatively large after the closure of a major hospital on the island, interviews with telehealth nurses reported that their salaries were not competitive with those offered by home health agencies on Oahu. Additionally, the program is freestanding and funded by a three-year project award, raising uncertainty over continued employment post-HCIA and likely contributing to turnover.

> "I was not familiar with the monitoring system but I think it's great because you have all of their vitals and you can see what their trends are. You can tell what is "normal" for an individual as opposed to just a clinical guideline."
>
> --Telehealth Nurse

Training. During the first two months of the funding period, telehealth nurses were trained alongside administrative, data management, and medical records staff. As enrollment grew, new telehealth nurses were recruited and primarily trained by shadowing and observation by an experienced nurse. When a telehealth nurse is hired, she is given a mentor in the program to assist with the onboarding process. This collaborative relationship continues after the official training process is complete. In a group discussion at NORC's site visit, telehealth nurses expressed satisfaction with the mutually supportive environment.

Context: H.O.P.E. in its Third Year

Recruitment has been a significant barrier to implementation for H.O.P.E. The program relies heavily on referrals due to cultural issues around allowing healthcare providers into the home. In Hawaii, asking to be invited into someone's home is a culturally sensitive request that requires a certain level of trust before it will be granted. As a result, the program depends on local physicians to recommend the program to their eligible patients. However, many patient referrals are ultimately unable to enter the program due to lack of electricity, support in taking daily health measurements, and access to a phone line.

> "We make sure that when a patient has an appointment, [the PCPs] have a copy of biometrics – [PCPs] find this to be invaluable with discussions with patient and modifying treatment. As a result we have many patients that are referred by physicians directly. In beginning it was tough, but [we] earned their trust. Two things that made this successful: this touch with patient and touch with physician. And I think that is the major contribution we have made."
>
> –H.O.P.E. leadership

Sustaining, Replicating, and Scaling H.O.P.E.

HMSA, the largest insurer in the state of Hawaii, is taking over the H.O.P.E. program. HMSA is retaining the operations and staff employed in the intervention.

Summary

Our claims-based findings for the H.O.P.E. intervention are mixed. For the one-year community telemonitoring arm, we observe non-significant decreases in cost and ACS hospitalizations, yet we also see non-significant increases in utilization. We see a promising trend in decreased cost for the time period participants remain enrolled in the telemonitoring arm (less than one year). For the 30-day post-acute care arm we see a decrease in 90-day hospitalizations and increases in practitioner follow-up visits (quality of care), but none of these changes reach statistical significance. We are limited by small sample sizes in both the one-year community program and 30-day post-acute program, and we may not be sufficiently powered to detect small differences in outcomes. In the 30-day post-acute program, less than thirty participants enrolled in each quarter, which limits our ability to see statistically significant differences in individual quarters. Additionally, the average length of time a participant was enrolled in the one-year community program was less than one year, which means we are unable to observe the program's longer-term effects. In the forthcoming No Cost Extension (NCE) report, we will report findings for the one-year community telemonitoring arm's entire period of performance. We will additionally conduct sensitivity analyses, in the NCE report, to assess impacts for the telemonitoring arm over the one-year time period that participants remain enrolled in the program.

References

HCIA Narrative Progress Report for St. Francis Healthcare Foundation, for Reporting Quarter End Date 12/31/2015. Submitted by St Francis, 1/29/2016.

HCIA Narrative Progress Report for St. Francis Healthcare Foundation, for Reporting Quarter End Date 3/31/2016. Submitted by St Francis, 5/7/2016.

HCIA Quarterly Report for St Francis, for Reporting Quarter End Date 12/31/2015. Submitted by St Francis, 3/2/2016.

HCIA Quarterly Report for St Francis, for Reporting Quarter End Date 3/31/2016. Submitted by St Francis, 6/1/2016.

South Carolina Research Foundation

HOME CARE+. Dedicated nurse care managers facilitate three care planning appointments at an enrollee's home to engage the beneficiary and caregiver(s) in goal-setting and create a patient-centered care plan. The intervention is hosted by home care agencies across the state of South Carolina. Training is offered to paid caregivers (personal care aides) to support implementation of the care plan, provide knowledge about managing chronic conditions, and improved communication with the beneficiary's health care providers.

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Care/Case Coordination, Chronic Disease Self-Management, Home Visits

LOCATION: Columbia, SC

GRANT: $2,884,719

AWARD DATES: 9/07/12 to 6/30/15
NO-COST EXTENSION: N/A
PAYER(S): Medicare, Medicaid

REACH: 673 beneficiaries (107% of target)
POPULATIONS: Adult, Rural, Racial/Ethnic Minorities, Disability
DATA: Medicare claims (1/13- 6/15); NORC survey of participants and workforce (2015); one site visit (2014); telephone interviews with leadership (2014-2016)

- Home care agencies hosted HOME CARE+ teams.
- Nurse care managers at each agency facilitated development of care plan over the course of three home visits with participant and caregiver.

- 17 licensed nurse care managers participated in experiential, competency-based training.
- A monthly series of 13 PCA training modules were developed and fielded.

- Home care agency implementation allowed flexibility in training and recruitment methods.
- Program found strong community relationships facilitated enrollment and participation.

OUTCOMES§

- Findings not statistically significant
- Increase in 30-day readmissions per quarter (112 per 1,000 beneficiaries)

- Increase in enrollees who report satisfaction with their PCA's skills in home care (93% vs. 84%).
- Increase in enrollees who report satisfaction with care coordination (97% vs. 89%).
- Increase in enrollees who agree or strongly agree that their personal wishes are taken into account (92%), that they are listened to (94%), and that what they say is taken into account (92%)

- Increase in enrollees who report excellent, very good, or good health (53% vs. 34%)

Analysis limited by small sample size and lack of Medicaid claims data.

SUSTAINABILITY, REPLICABILITY, & SCALING

HOME CARE+ transferred the online training modules to the University of South Carolina Arnold School of Public Health Learning System.

HOME CARE+ is no longer in operation. The awardee plans to share information on the model with the South Carolina State Demonstration to Integrate Care for Dually Eligible Individuals.

§Outcomes for cost and utilization are from analyses that include a comparison group and reach statistical significance at the $p<0.10$ level. Outcomes for quality of care and health are from NORC consumer survey and NORC analysis of awardee's consumer survey; findings reported in terms of change (increase or decrease) have reached statistical significance at the $P<0.05$ level.

Overview of South Carolina Research Foundation HOMECARE+

Background. HOMECARE+, operated through the South Carolina Research Foundation (SCRF) in the Arnold School of Public Health at the University of South Carolina (USC), brings an advanced and specialized workforce to preventive in-home care. It employs care coordinators to provide patient-centered care planning, and trained personal care aides to improve chronic disease management. The program operates in 23 state counties through partnerships with existing services of regional home care agencies that provide Medicaid-reimbursed home care services.

The intervention struggled with gaining the trust of potential and enrolled participants, in particular due to the home visit component of the program. This lack of trust was especially challenging in terms of receiving identifiable information for the evaluation. Prior to the intervention there was a state Medicaid data breach, releasing Medicaid recipients' personal health information. Due to that breach and others in the state, the program was prohibited by South Carolina law from requiring Medicaid or Social Security information from participants. Many participants did not feel secure sharing this information, which led to challenges with data completeness.

Goals. In addition to the CMMI core performance measures, HOMECARE+ focuses on developing and implementing patient-directed care plans, delaying time until participants enter skilled nursing facilities, and increasing home care workforce capacity. The goal is to enhance an existing home care Medicaid reimbursement structure with trained in-home workers and personalized relationships with clinicians, allowing participants to age safely and knowledgeably in the comfort of their homes.

Program Models. HOMECARE+ brings an advanced and specialized workforce to preventive in-home care. Care coordinators provide patient-centered care planning and trained personal care aides improve chronic disease management. The program employs a new model that pairs a care coordinator nurse with an existing personal care aide, who has received additional training. These nurses, referred to as home care consultants (HCCs), work with clients, their family caregivers, and personal care aides to coordinate day-to-day care. South Carolina provides an agency-facilitated training program for personal care aides (PCAs). Trained PCAs are referred to as home care specialists (HCSs).

The cornerstone of the program is the person-centered approach, which is enforced through the HCC training and initial intake procedures. For example, in the enrollment visit, the HCC does not begin with medical assessments but with a general, informal assessment to get to know participants, understand their challenges and strengths, and identify their goals. The first three appointments, which happen within the first three weeks of enrollment, are very high touch, with the staff investing considerable face-to-face time with participants to develop trusting and honest relationships.

Implementation Updates. SCRF used the third year of the intervention to complete production of 13 modules for the Home Care Specialist Training on Chronic Health Conditions for online presentation, including a voice over and post-test. These modules are expected to be available on the University of South Carolina School of Public Health Learning System. Noteworthy findings since NORC's Second Annual Report to CMMI (2016) include the following:

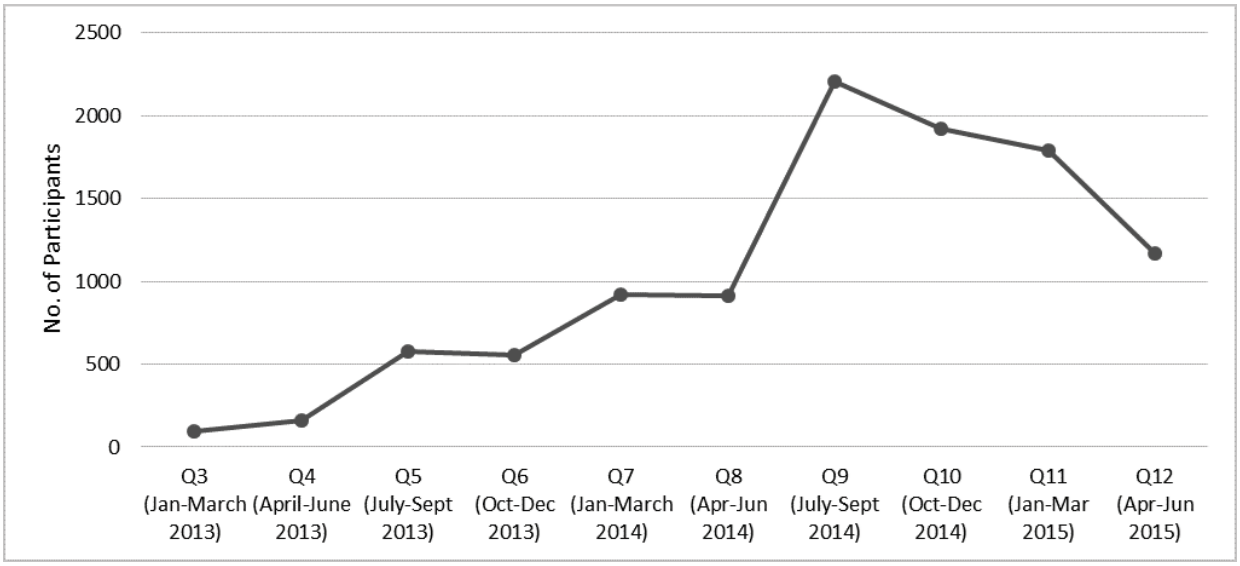
- **Training.** The awardee faced continued difficulties in fidelity to the training model across personal care provider agency partners, so it conducted a root cause analysis to determine barriers to training.

SCRF unexpectedly found that each personal care provider agency did not designate a trainer, and that scheduling trainings was difficult given the home visiting work schedule. The awardee began monitoring the training more closely and communicated more with trainers. SCRF further met these challenges by creating the online format for trainings.

- **Data Collection.** The grant program staff was working out of the Office on Aging in Columbia, South Carolina, but most HCC and HCS staff were dispersed, with the personal care provider agency serving as a central hub. Even though the grant came through USC, the personal care provider agencies set the agenda for their grant-related employees. Project leadership describe an ongoing challenge, as a result, in the gathering of timely and accurate data for use in the evaluation and to develop a business case for sustainability.

Reach and Demographic Profile of Enrolled Beneficiaries. As of June 30, 2015, HOMECARE+ served a cumulative total of 673 unique direct participants since the program launch. For the group of participants served during the period from April 1 through June 30, 2015, almost half are 75 years or older (43 percent), 25 percent are age 65 to 74 years, and 32 percent ages 26 to 64 years. Three-quarters are are female. Sixty-five (65) percent are Black or African American, and 34 percent are white.

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



Summative Findings (Outcomes)

The HOMECARE+ program shows a significant increase in patients with 30-day readmissions for Medicare beneficiaries, relative to the comparison group.

In the following section we present our analyses of program effectiveness, based on three types of data: claims, Medicare Fee-For-Service (FFS); the awardee's survey of participants, in addition to NORC surveys of participants and workforce trainees; and narrative from NORC interviews and one site visit.

Core and Supplemental Measures

Our community (ambulatory care) analysis compares the experiences of SCRF enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's HOMECARE+ innovation over the enrollment period as a whole and each quarter of program enrollment. Our analysis is for Medicare FFS beneficiaries, comprising 26 percent of all HOMECARE+ enrollees.[220]

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department Visits
- 30-day Readmissions
- Ambulatory Care-Sensitive (ACS) Hospitalizations

Finder File and Creation of Analytic Sample.
SCRF provided a finder file of program participants and enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[221] We identified 284 unique beneficiaries, and further limited this number by enrollment date, Medicare identifiers, and chronic conditions, yielding an analytic sample of 172 beneficiaries.

Comparison Group. The comparison pool consists of non-institutionalized Medicare FFS patients in the same zip codes in South Carolina as the HOMECARE+ program participants. We directly match comparison beneficiaries to HOMECARE+ participants based on zip code. We use propensity score matching to find appropriate comparators.[222] The final propensity score model includes age, race, gender, dual eligibility, disability status, Chronic Illness and Disability Payment System (CDPS) risk score, and prior-year utilization (hospitalizations and ED visits) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[223]

Descriptive Characteristics. Exhibit SCRF.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, CDPS risk score, and prior utilization.[224] We observe no differences in demographics, CDPS risk score, or prior utilization measures.

Exhibit SCRF.2: Descriptive Characteristics for HOMECARE+ and Comparison Group Beneficiaries

Variable	SCRF	Comparison
Number of Beneficiaries	172	172
Mean Number of Quarters Enrolled [Range]	5.6 [1-11]	5.6 [1-11]
Gender % (N)		
Female	74.4 (128)	72.1 (124)

[220] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[221] Medicare claims are available through March 31, 2016 for the analysis in this report. We used December 31, 2015, as the cut-off date to account for the 90-day claims runoff.

[222] For more information on propensity score matching, please refer to Appendix C.

[223] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[224] We tested differences between the groups with a t-test for continuous measures (CDPS risk score and utilization before index hospitalization) or a chi-square test for categorical parameters (age, race/ethnicity, dual eligibility, and coverage reason).

Variable	SCRF	Comparison
Age Group % (N)		
<65 years	26.2 (45)	26.2 (45)
65-69 years	14.5 (25)	11.6 (20)
70-74 years	11.6 (20)	13.4 (23)
75-79 years	9.3 (16)	7.0 (12)
80-84 years	13.4 (23)	15.7 (27)
≥85 years	25.0 (43)	26.2 (45)
Race/Ethnicity % (N)		
White	38.4 (66)	39.0 (67)
Black	61.6 (106)	61.0 (105)
Dual Eligibility % (N)		
Dual Enrolled	87.2 (150)	87.2 (150)
Coverage Reason % (N)		
Age	48.8 (84)	48.8 (84)
Disability	50.0 (86)	46.5 (80)
Disability & ESRD	1.2 (2)	4.7 (8)
Chronic Illness and Disability Payment System (CDPS) Risk Score		
Mean CDPS Risk Score (Standard Deviation)	2.4 (1.9)	2.3 (2.2)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost (SD)	$21,957 ($31,776)	$19,789 ($30,823)
Hospitalizations (SD)	674 (1,380)	663 (1,176)
ED Visits (SD)	1,465 (2,407)	1,651 (3,222)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of HOMECARE+ Program. Exhibit SCRF.3 displays the average quarterly and aggregate impact of the HOMECARE+ innovation on its participants relative to the comparison group.[225] Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[226] We find the following for the HOMECARE+ program, relative to the comparison group:

- **Cost:** A non-significant increase in total quarterly cost of care.
- **Utilization Measures:** A statistically significant increase in 30-day readmissions per quarter (112 per 1,000 beneficiaries) and non-significant increases in hospitalizations and ED visits.
- **Quality of Care:** A non-significant increase in ACS hospitalizations.

[225] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, dual eligibility indicator, CDPS risk score, and disability indicator.

[226] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit SCRF.3: Impact of HOMECARE+ Program on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	$129 [-$894; $1,152]
Hospitalizations	20 [-18, 58]
ED Visits	3 [-37, 43]
30-Day Readmissions	**112 [13, 211]***
Ambulatory Care-sensitive Hospitalizations	4 [-16, 24]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$118,249 [-$818,715; $1,055,213]
Hospitalizations	19 [-16, 54]
ED Visits	2 [-35, 39]
30-Day Readmissions	**17 [2, 32]***
Ambulatory Care-sensitive Hospitalizations	3 [-16, 22]

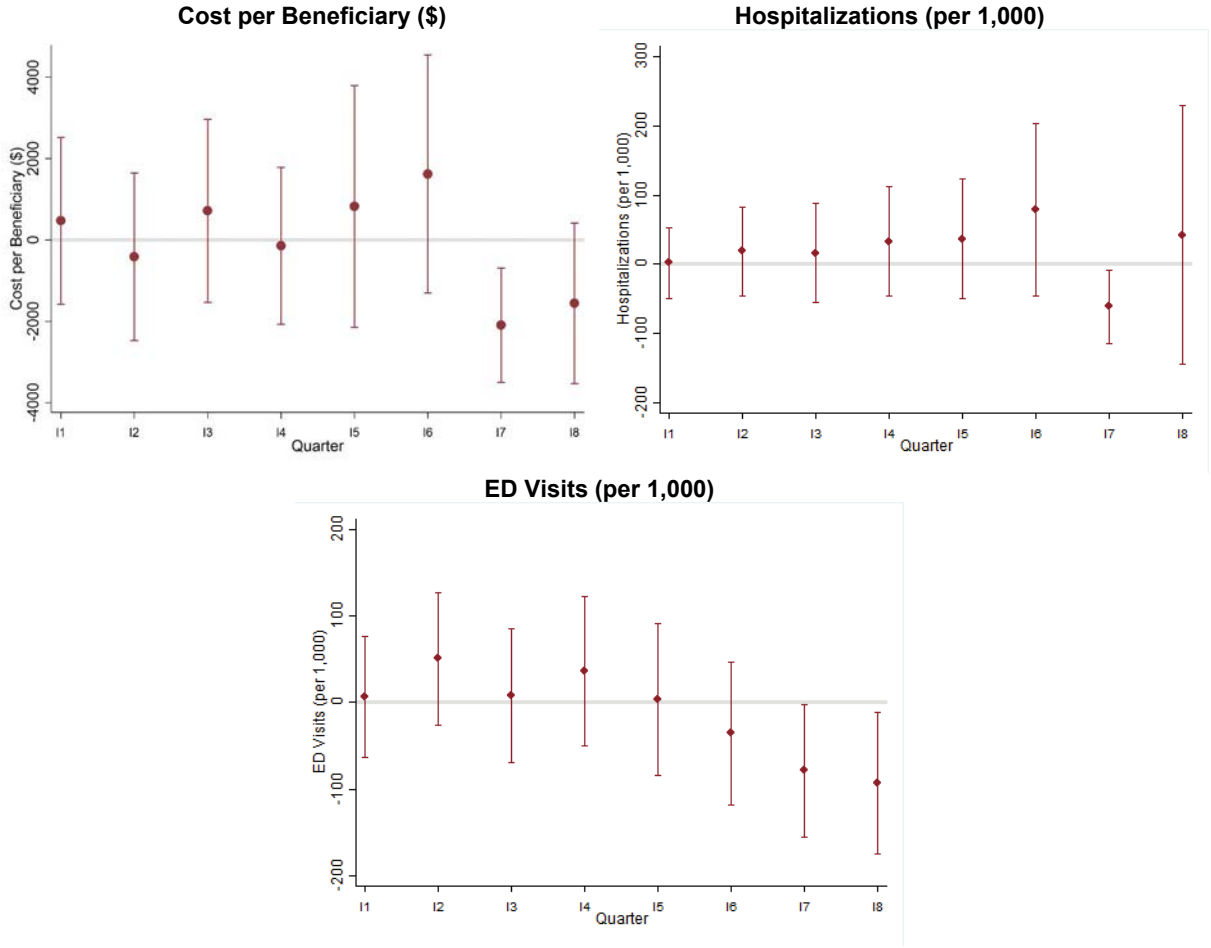
NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (172), with an average length of program enrollment of 5.6 quarters, ranging from 1-8 quarters.

Impact of HOMECARE+ Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of 30-day readmissions and ACS hospitalizations are consistent with the average quarterly impact summarized above. Exhibit SCRF.4 displays the results of the QFE DID models of impact for total cost of care, hospitalizations, and ED visits.[227] Adjustment factors in the model include age category, race/ethnicity, extent of FFS coverage, dual eligibility indicator, CDPS risk score, and disability indicator. We find the following, relative to the comparison group:

- **Cost:** No overall trend is present in total cost; however, there is a statistically significant decrease in quarter I7.
- **Utilization Measures:** There is a decreasing trend in ED visits after one year of program enrollment, with statistically significant decreases in quarters I7 and I8; an overall increasing trend in hospitalizations can be seen across the post-intervention period with the exception of a statistically significant decrease in quarter I7.

[227] For total cost of care, this effect is displayed per beneficiary. For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I8) period, after adjusting for pre-intervention differences between the two groups. See Appendix D for a more detailed explanation of the QFE DID models and measure specification.

Exhibit SCRF.4: Impact of HOMECARE+ Program on Outcomes, by Quarter



Quality of Care (Survey and Qualitative Findings)

In addition to claims-based findings about quality (as measured by Medicare claims data), NORC's evaluation documents improved patient satisfaction, as measured through survey data, interviews, and focus groups.

Beneficiary Experience and Satisfaction. In the awardee-collected survey, respondents were overwhelmingly satisfied with their home care, both at baseline (83 percent were extremely or very satisfied) and at the six-month follow-up (with 93 percent combined). In addition, survey respondents showed statistically significant ($p<0.05$) improvements in their self-reported health status, a subset of general satisfaction questions, all medication adherence and understanding questions, and questions about where they recently sought medical care.

At the six-month follow-up survey, the majority of survey respondents indicated that they received high-quality and supportive care. These percentages reflect increases in satisfaction from the baseline survey. In fact, participants reported increases in satisfaction and ratings of care across all satisfaction and quality variables between baseline and follow-up.

- **Medication Adherence.** Awardee-collected survey findings reflect modest increases in positive medication habits, such as the 27 percent increase in respondents who say they never or almost never forget to take their medicine. Results also show large decreases in reported negative medication habits, including a 61 percent decrease in the number of respondents who report that they sometimes forget to take their medicine.
- **Making Medical Decisions and Seeking Care.** The awardee-collected survey asked four open-ended questions about who helps respondents with their medical care and decisions. Aside from family members, the most frequent response was doctor's office across all four questions; responses for both family member and doctor's office increased slightly from baseline to follow-up. As expected, HCCs were rarely a first point of contact at baseline, but responses show a sharp increase in reliance on this new role at the six-month follow-up.

With the emphasis on care coordination in the HOME CARE + intervention, the survey responses unsurprisingly indicate a decreased reliance on emergency care as a first response between baseline and follow-up surveys. Additionally, survey respondents were asked the number of times they had sought medical care in the past six months at the doctor's office, hospital, ED, and urgent care. T-tests of mean visits to each resource at baseline and follow-up show statistically different ($p<0.05$) means for doctor's office, hospital, and ER visits, including a decrease in the mean number of reported trips to the ED from one trip to zero trips in the last six months.

Caregiver Experience. The caregiver and family focus group reflected less conclusive evidence of satisfaction. Many caretakers could not identify the program or were not sure if their family member was enrolled. Part of this confusion stemmed from the inability to identify which services were from HOME CARE+ versus other in-home services provided to their family member. One caregiver who recognized the program and related staff was unhappy with the care provided by the program because it was not clinical, which the caregiver felt was the purpose of a nurse entering the home.

Health. Evidence related to HOME CARE+'s impact on health is limited. In the awardee-collected survey, responses to the self-reported health status question show large increases in reports of very good health and decreases in reports of poor health between baseline and follow-up. When tested (with a t-test between excellent/very good/good versus fair/poor), these differences were found to be statistically significant ($p<0.05$).

Workforce Development

Evidence about HOMECARE+'s staffing model and training comes largely from NORC's survey of personal care aides (Home Care Specialists); 65 percent of respondents (n=121) completed all 13 HCS training modules; see Appendix F for the full set of survey findings.

Staffing. The USC offices in Columbia serve as home base for the HOME CARE+ program. The HCCs and HCSs work primarily from clients' homes or their employer agency offices. The personal care provider agency relationship is key for the HOME CARE+ program. Each personal care provider agency opts into the program, volunteering the trainer and office space in return for the training curriculum and the HCC. The personal care provider agencies are responsible for interviewing and hiring the HCC, while the intervention covers the salary and training costs. While the HCC is a new role created by the

intervention, the HCS created a new title and expanded training for an existing PCA role. In addition to client care and coordination duties, the HCCs supervise the HCS within their agency. Together, they present themselves as the consumer's personal care team. The HCSs provide unskilled care to both HOME CARE + and other clients. The awardee reports relatively high turnover among the HCS role, but ascribes this to the field as a whole.

Almost all PCA respondents reported that their HCCs were easy to communicate with, supportive, and helped them provide better care to their clients. Almost all respondents (99 percent) agreed that their HCC helped them to provide better care to their clients. (n=157). Of the 160 PCAs that responded, all agreed that they feel supported by their HCC. Almost all survey respondents (personal care aides) report that their HCCs listened to them, addressed their concerns, let them know what they were doing well, and suggested ways they could do better. Of PCAs that responded (n=158), almost all found this feedback very helpful (85 percent) or somewhat helpful (14 percent).

Training. Training for both roles takes place independently, with HCCs receiving an initial period of intensive training prior to beginning work with clients. HCSs participate in ongoing, monthly in-service training throughout the first year of involvement in the intervention.

- For the HCCs, training consists of two weeks of one-on-one coaching with the HOMECARE+ program manager, focusing on competencies and role-playing. The training emphasizes the concepts of person-centeredness and of collaborative decision-making. 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. One HCC remarked that she "loves the questions that HOME CARE+ told us to ask. I have never asked, 'What's important to you?'" Another HCC expressed that removing the onus of compliance or non-compliance from the client results in a more positive mindset.
- Training for the HCSs consists of 12 chronic disease modules, which are presented once a month. Each module focuses on recognizing signs and symptoms, as well as improving basic care techniques, such as hand washing, observation, and note taking. HCSs do not receive a change of position or pay for their participation in the HOME CARE + program. The training is an in-kind contribution by the personal care provider agencies, which design the organization and scheduling of the training modules; as a result there is variation in the training implementation.

PCAs who responded to the survey were very positive regarding the HCS trainings. Almost all (96 percent) report that the HCS trainings made them feel better prepared to be a PCA and more helpful to their clients, and that the skills they learned help them to perform their duties with clients (98 percent). Over half (59 percent) report that they like their job more since starting the HCS trainings, and 38 percent report liking it about the same.

Implications for Workforce. In the NORC-collected survey responses, PCAs were satisfied with the quality of care they were providing and planned to continue in this line of work. About three-quarters of respondents (73 percent) reported that when they thought about their work as a PCA, they viewed it as a long-term career; 11 percent viewed it as a short-term job, 13 percent did not know, and 3 percent did not respond. All PCAs who responded about their quality of care (n=185) were either very happy or somewhat happy with the quality of care they provide to their clients.

Given the reimbursement constraints, especially within South Carolina Medicaid, the additional training of the HCC and the HCS is a difficult fit for the fee-for-service structure. The model has various uncompensated pieces, such as HCS attendance at training and HCS trainers. In some personal care provider agencies, additional components such as mileage or benefits are also uncompensated. The ability to integrate these positions and educational priorities into a personal care provider agency culture would play an important role in their success.

Context: HOMECARE+ in its Third Year

External. As mentioned previously, there was a Medicaid data breach in the months before the program was implemented, which meant that program staff struggled to connect and earn the trust of the target population, especially for a home visiting program. Additionally, one of the program's goals was to deliver advance care planning to the target population. The target population was unreceptive to this component of the program, citing cultural differences in discussing end-of-life planning with non-family members.

Internal. There is a high degree of variability between participating personal care provider agencies concerning most aspects of the HOMECARE+ innovation, including HCS trainer and training schedule, incentives available to HCS staff, the benefits and salaries of HCCs (personal care aides) and to what extent HCCS are integrated into the workflow of the personal care agency. The program staff was expecting more uniformity based on their close relationships with personal care provider agencies, but leadership changes and new personal care provider agencies changed the working relationships.

Sustaining, Replicating, and Spreading Innovation

Sustainability. While the HOMECARE+ innovation is not being sustained as it was implemented using HCIA One funds, the awardee has shared plans to sustain specific elements of the intervention. These elements include the dissemination of online training for personal care aides and related outreach and marketing; prospective partnership with the state Department of Health and Human Services around formal recognition of the HCS (nurse care manager) role, with its associated training, and incorporation of HOMECARE+ staffing models into future Medicaid waiver scope of services and demonstrations to integrate care for dually eligible South Carolina residents. In addition, the awardee has expressed interest in obtaining state Medicaid co-pay data, to enable analyses supporting development of a business case for HOMECARE+.

Replicability and Scaling. Awardee has transferred the HCS training modules to the USC Arnold School of Public Health Learning Management System. They are working to develop a marketing plan to disseminate this information.

Summary

Without access to Medicaid data, our assessment of SCRF's HOMECARE+ innovation is limited. Using claims that represent only 26 percent of enrollees (Medicare FFS), our analysis may not be representative of the larger group of participants. For the subgroup of Medicaid FFS participants, we see a statistically significant increase in 30-day readmissions and non-significant increases in total cost of care,

hospitalizations, ED visits, and ACS ambulatory care-sensitive hospitalizations, relative to the comparison group. Together, these findings suggest that HOMECARE+ participants may be benefitting from increased access to care, rather than being disadvantaged by participation in HOMECARE+..

References

HCIA Narrative Progress Report for South Carolina Research Foundation, for Reporting Quarter End Date 6/30/2015. Submitted by SCRF, 6/17/2015.

HCIA Quarterly Report for SCRF, for Reporting Quarter End Date 6/30/2015. Submitted by SCRF, 08/31/2015.

Sutter Health Corporation

Advanced Illness Management (AIM). AIM coordinates care across multiple care settings (hospital, home health, provider offices, on-call triage) for late-stage patients and their caregivers. It is supported by a unified electronic health record (HER) system and nurse-led, interdisciplinary teams. Its organization relies on a rubric of five pillars of care: (1) personal goals and advance care planning, (2) symptom management, (3) medication management, (4) follow-up with provider(s), and (5) patient engagement.

PROGRAM MODELS: Advanced Care Planning, Care/Case Coordination, Home Health/Home Care, Patient Navigation, Transitional Care

LOCATION: California

GRANT: $13,000,000

AWARD DATES: 7/1/12 to 6/30/15

NO-COST EXTENSION: N/A

PAYER(S): Medicare

REACH: 9,406 beneficiaries (88% of target)

POPULATIONS: Older Adults, Racial/Ethnic Minority

DATA: Medicare, claims (1/10-6/15); 2 site visits (5/14, 5/15); NORC Workforce Survey; Sutter Patient Survey

- Replication of model across sites required flexibility to fit local mix of Sutter and non-Sutter partners.
- Ten of 11 sites launched in waves, with the eleventh site launched after HCIA One funding was complete.
- New AIM Epic EHR modifications enable capacity to gather, monitor, and share data from different platforms, supported by new data warehouse.

- Consistent and frequent training of interdisciplinary care teams.
- Training preceptors for each site, mentoring in the field, and competency-based testing.

- Each site operated under home health or hospice license, adapting staffing and management to meet licensing and regulatory requirements.
- Challenge to ensure continuity when beneficiaries are discharged from hospital, given federal requirement to offer non-Sutter home health placement.

OUTCOMES§

- Decrease in cost of care in the last 30 days of life (-$5,657 per beneficiary per quarter)

- Decrease in hospitalizations in the last 30 days of life (-71 per 1,000 beneficiaries per quarter)
- Increase in ED visits in the last 30 days of life (28 per 1,000 beneficiaries per quarter)

- Enrollees report high level of satisfaction with the program
- Caregivers credit AIM with lowering stress related to caregiving and improving sense of security and self-confidence as a caregiver.

SUSTAINABILITY, REPLICABILITY, & SCALING

Sutter Health is sustaining the AIM program at the two sites established prior to HCIA funding and the 11 new HCIA-funded sites. It is investing its own funds to underwrite the AIM components that are not eligible for Medicare reimbursement and pursuing opportunities to contract with payers, secure supplemental philanthropic and grant funding, and explore further regional or national pilots under the Medicare program.

Sutter Health leaders are serving as consultants to other organizations interested in implementing a program like AIM. The awardee has not shared plans to add new AIM sites within the Sutter Health system.

§Outcomes for cost and utilization are from analyses that include a comparison group and are statistically significant at the $p<0.01$ level. Outcomes for quality of care are from focus groups.

Overview of the Advanced Illness Management Program

Background. Sutter Health Corporation's Advanced Illness Management (AIM) intervention offers care coordination among hospital, home health, physician's office, and hospice care, delivered by interdisciplinary teams of nurses and social workers, for seriously ill patients within the Sutter Health system. AIM targets participants 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. Sutter Health has been involved in care coordination for people with multiple chronic conditions (MCC) for many years, and piloted AIM in 2009 at its Sacramento location. Sutter Health used the HCIA funds to replicate and scale a revised AIM model across 11 sites affiliated with the Sutter Health system. Sutter Health was piloting different ways to operationalize and replicate the AIM model, at sites with different types of licensure requirements (home health, hospice), and organizational hosts inside and outside of the Sutter Health system.

Goals. Although Sutter Health shares the CMMI interest of reducing utilization and Medicare costs for enrolled beneficiaries, the awardee identified objectives that are more closely tied to improvements in the care of late-stage, medically complex patients. These include lengthened time of AIM enrollment by catching participants before they are hospice-eligible (e.g., earlier in their disease trajectory), greater engagement with advance care planning (ACP), and increasing the election of hospice care where appropriate. Another important set of objectives relate to the awardee's goal of testing the replicability of the AIM model.

Program Models. The AIM program modifies transitional care to include warm handoffs across multiple care settings (hospital, home health, outpatient primary and specialty care, telesupport, after-hours telephone triage) and extends the period of engagement with enrolled beneficiaries and caregivers from the 30 to 45 days often found with transitional care programs to months and, for some, years. It is a hybrid that combines features of home health with those of a hospice, organized around delivering services that support an AIM-specific rubric known as the Five Pillars of Care. AIM functions as a type of bridge between curative, medical care and hospice and operates closely with outpatient palliative care services.

Five Pillars of Care
- Personal Goals and Advance Care Planning
- Management of Red Flag Symptoms (e.g., Stop Light tools, teach back methods)
- Medication Management
- Physician Follow-up Visit(s)
- Patient and Caregiver Engagement

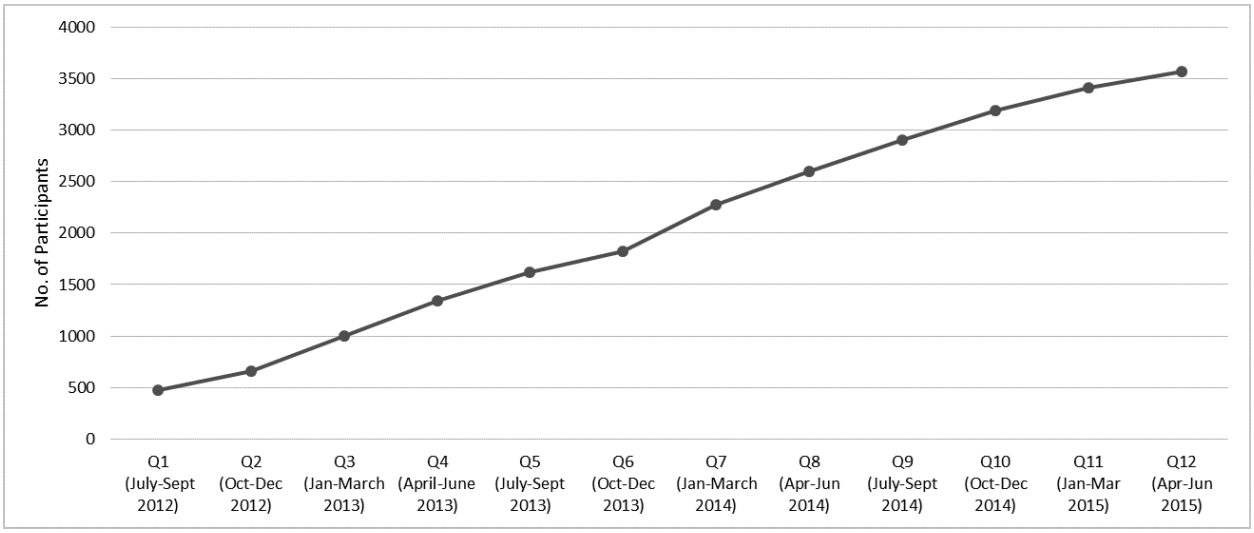
Sutter Health has created a health IT infrastructure to support AIM, working toward full integration with the Epic application used in Sutter hospitals and with the Homecare Homebase electronic health record (EHR) used by Sutter home health agencies. A Pillar Focused Care Note is a central communication tool of the EHR.

While the AIM management team has emphasized program model fidelity across implementation sites, it has also leveraged local staffing and partner opportunities to pilot new practices, including a clinical pharmacist consult and referrals to an outpatient palliative care practice.

Implementation Updates. Key developments related to implementation during the final months of performance include the continuing development and launch of internal EHR (Epic) and data-sharing systems across Sutter, supported by a data warehouse; the launch of an after-hours telephone triage system tied to the EHR and increasing use by affiliated providers of a daily "tuck-in" call service to contact enrollees; and the addition of project medical directors from a partner outpatient palliative care practice that is part of the Palo Alto Medical Foundation.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from Sutter Health provide participation by HCIA reporting quarter, as seen in Exhibit AIM.1. There has been a gradual increase over time. During the most recent quarter for which data are available (April 1 through June 30, 2015), the awardee reports serving 3,570 participants. For the group of participants directly served during the period from April 1 through June 30, 2015, 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). More than half are female (59 percent). Almost two-thirds are identified as White (62 percent), with 10 percent identified as Asian, 9 percent as African American, and about 5 percent as Hispanic or Latino.

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



Summative Findings (Outcomes)

The AIM intervention is associated with a significant reduction in average Medicare costs and in hospitalizations for beneficiaries in the last 30 days of life, although there is an increase in ED visits.

In the section below we present our analyses of program effectiveness, based on three types of data: Medicare Fee-For-Service (FFS) claims, surveys from Sutter Health's survey of participants, and narrative from NORC interviews and two site visits. Identifying a suitable comparison group for assessment of the claims experiences of all beneficiaries has not been successful to date. We include a supplemental analysis (survival curve) that demonstrates the bias introduced by otherwise unobserved or unmeasured variation in disease-trajectory in prospective comparators; for this reason, our analysis of

beneficiaries in the last 30 days of life, rather than all enrolled beneficiaries, is the primary analysis presented in this chapter.

Core Measures: End-of-Life Experience

Our community, cross-sectional analysis compares the experiences of Sutter Health enrollees in the last 30 days of life with those of a matched group of comparators. It considers the impact on cost and utilization of the awardee's AIM intervention. Our analysis is for Medicare FFS beneficiaries, comprising 25 percent of all AIM enrollees.[228]

Finder File and Creation of Analytic Sample, End-of-Life Analysis. Sutter Health provided a finder file that lists program participants and enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[229] We identified 10,519 unique beneficiaries, and further limited this number by enrollment date, Medicare identifiers, chronic disease flags, and Charlson Comorbidity Scores in the year prior to enrollment.[230] We then constructed an index date for AIM participants and comparators that is one month prior to the date of death. We used cost and utilization variables noted in claims during the 60 days prior to this index date in the end-of-life analysis, yielding a final analytic sample of 3,339 AIM beneficiaries.

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- Hospitalizations
- Emergency Department (ED) Visits

Comparison Group, End-of-Life Analysis. We use Medicare claims to create an external comparison group comprising two comparison counties in California (Alameda and Santa Clara) similar to the treatment counties (Yolo/Sacramento, Placer/El Dorado, Sonoma, San Mateo, Solano, Alameda, Contra Costa, and San Francisco.[231] We use claims-based rules to select Medicare FFS beneficiaries in Alameda and Santa Clara counties who were not enrolled in the AIM program and who died in 2013, 2014, or 2015. We use propensity score matching to find suitable comparators. The final propensity score models include age, race, ethnicity, gender, disability eligibility, HCC scores, number of hospitalizations in the past 60 days, number of ED visits in the past 60 days, and total cost of care in the past 60 days. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching greatly improves comparability.[232]

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[228] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[229] Medicare claims are available through December 31, 2015, for the analysis in this report. We used June 30, 2015, as the cut-off date, reflecting the end date of the awardee's period of performance with HCIA support.

[230] The Charlson Comorbidity Score predicts one-year risk of death. For more information, see Charlson M., Wells M.T., Ullman R., King F., Shmukler C. (2014). The Charlson comorbidity index can be used prospectively to identify patients who will incur high future costs. *PloS one*, *9*(12): e112479.

[231] Selection was 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 rates, ED visit rates, and per capita costs. See Appendix C for more about our analytic approach.

[232] For more information about our approach to propensity score matching, see Appendix C; for tests of common support and covariate balance, please see Appendix D.

Descriptive Characteristics, End-of-Life Analysis. Exhibit AIM.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison groups. We compare the two groups with respect to demographics, comorbidities, and prior utilization.[233] AIM participants tend to be younger, more likely to be White or African American, less likely to be Hispanic, less likely to be covered by Medicare due to end-stage renal disease (ESRD), and have fewer comorbidities, with a lower hierarchical chronic conditions (HCC) score, than are comparison group members. AIM participants have elected for hospice care more often than have comparators.

Exhibit AIM.2: Descriptive Characteristics for AIM and Comparison Group Beneficiaries, End-of-Life Analysis

Variable	AIM	Comparison
Number of Beneficiaries	3,339	3,339
Gender % (N)		
Female	53.3 (1,778)	53.9 (1,798)
Age Group % (N)*		
<70 years	18.5 (619)	17.3 (578)
70-74 years	11.3 (376)	10.4 (347)
75-79 years	13.2 (441)	11.6 (388)
80-84 years	15.1 (504)	15.6 (522)
85-89 years	17.5 (583)	18.6 (620)
90+ years	24.4 (816)	26.5 (884)
Race/Ethnicity % (N)***		
White	78.1 (2,608)	74.4 (2,484)
Black	8.9 (296)	7.5 (246)
Other	13.0 (435)	18.2 (609)
Hispanic	8.8 (292)	9.1 (303)
Coverage Reason (N)**		
Age	81.0 (2,705)	80.5 (2,687)
Disability	17.9 (596)	17.5 (586)
ESRD/Disability and ESRD***	1.1 (38)	2.0 (66)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)***	4.5 (2.2)	4.7 (2.5)
Mean Utilization and Cost in the 60 Days Prior to Last 30 Days of Life (per 1,000 beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD)	$18,263 ($22,233)	$18,967 ($26,609)
Hospitalizations (SD)	542 (786)	521 (784)
ED Visits (SD)	334 (747)	313 (744)
Election of hospice care (N)***	69.4 (2,317)	44.2 (1,475)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of AIM Program, End-of-Life. Exhibit AIM.3 displays the average quarterly and aggregate impact of AIM on its participants in the last 30 days of life, relative to the comparison group.[234] We find the following, relative to the comparison group:

[233] We test differences between these groups with a t-test for continuous measures (comorbidities, prior utilization, prior total cost of care, and placement in hospice) or a chi-square test for categorical parameters (gender, age, race, ethnicity, and coverage reason).

[234] Adjustment factors include age, race, ethnicity, gender, HCC risk score, and disability eligibility.

- **Cost:** A statistically significant decrease in cost of care during the last 30 days of life (-$5,657 per beneficiary).
- **Utilization:** A statistically significant decrease in hospitalizations in the last 30 days of life (-71 per 1,000 beneficiaries) and increase in ED visit (28 per 1,000 beneficiaries) in the last 30 days of life.

Exhibit AIM.3: Impact of AIM Program on Outcomes, End of Life Analysis

AVERAGE QUARTERLY IMPACT	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Difference [90% Confidence Interval]**
Total Quarterly Cost of Care per beneficiary ($)	**-$5,657 [-$6,440, -$4,874]*** **
Hospitalizations	**-71 [-90, -52]*** **
ED Visits	**28 [13, 43]*** **
AGGREGATE IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Difference [90% Confidence Interval]**
Total Cost of Care per beneficiary($)	**-$18,888,723 [-$21,503,160, -$16,274,286]*** **
Hospitalizations	**-237 [-301, -174]*** **
ED Visits	**93 [43, 144]*** **

OTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where results reach statistical significance. §Aggregate Impact is the total adjusted difference estimate for all program participants across all observed periods of enrollment (last 30 days of life), derived by multiplying the estimate by the number of program participants (3,339).

Supplemental Analysis: Outcomes for All Beneficiaries

We provide a supplemental community analysis to demonstrate the unique analytical challenges posed by studying AIM's target population. Our community analysis compares the experiences of Sutter Health enrollees with those of a matched group of comparators. As noted above in the analysis of experience at the end of life, our analysis is for Medicare FFS beneficiaries in the AIM program, comprising 25 percent of AIM enrollees. The presence of unmeasured differences between enrolled beneficiaries and comparators in disease trajectory or acuity significantly limits our ability to use a summative DID approach to evaluation in a meaningful way; for this reason, we include the results of the supplemental analysis in Appendix D but do not consider these findings to represent an accurate assessment of the AIM program.

Finder File and Creation of Analytic Sample, All Beneficiaries. We use the analytic sample of 4,316 individuals, created as described in the preceding section. It includes individuals for whom claims had complete measures of chronic disease flags and Charlson Comorbidity scores in the year prior to enrollment, as well as enrollment prior to June 30, 2015; Medicare FFS beneficiaries during the month of program enrollment; and those having a Medicare beneficiary identifier.[235]

[235] Medicare claims are available through December 31, 2015, for the analysis in this report. We used June 30, 2015, as the cut-off date, reflecting the end date of the awardee's period of performance with HCIA support.

Comparison Group, All Beneficiaries. We identify two comparison counties as described in the preceding section. [236] We then create a comparison pool by selecting Medicare beneficiaries who are not enrolled in the AIM program in Alameda and Santa Clara counties.

We use propensity score matching to find appropriate comparators. [237] The final propensity score model includes risk scores (HCC, Charlson Comorbidity Score); age; race; ethnicity; gender; dual eligibility; disability eligibility; diagnosis of chronic kidney disease, congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), hip fracture, stroke/transient ischemic attack (TIA), breast cancer, colorectal cancer, lung cancer, and anemia; health care utilization in the past year (hospitalizations and ED visits); and total cost of care in the past year. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching greatly improves comparability. [238]

Survival Analysis, All Beneficiaries. While propensity score matching improves comparability across identified covariates, our survival analysis, which uses a Cox Proportional Hazard Model, demonstrates a remaining discrepancy between treatment and comparison groups. As displayed in Exhibit AIM.4, our model shows a significantly lower rate of survival beyond the enrollment period among AIM beneficiaries versus comparators. Overall, AIM-enrolled beneficiaries were over three times as likely to die (320 percent). [239] These results show how NORC's limited ability to use claims to identify medically frail beneficiaries who meet AIM enrollment criteria introduces significant bias into our evaluation. For this reason, NORC's end-of-life analysis is considered the primary assessment for the AIM program, rather than our analysis of the experiences of all AIM enrolled beneficiaries; please seen Appendix D for presentation of findings from the analysis for all beneficiaries..

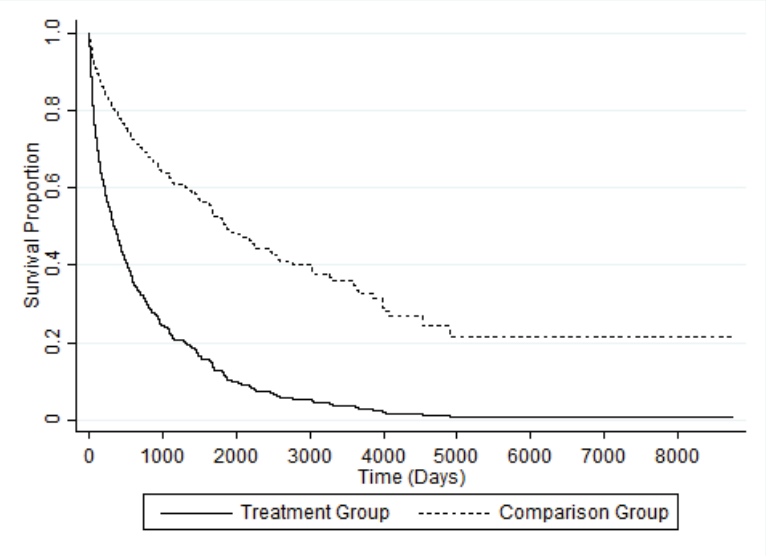
[236] See Appendix C for more about our analytic approach.

[237] For more information on propensity score matching, please refer to Appendix C.

[238] For more information about our approach to propensity score matching, see Appendix C; for tests of common support and covariate balance, please see Appendix D.

[239] Hazard Ratio= 3.19, 95% CI 2.93, 3.48, p<.001.

Exhibit AIM.4: Differences in Survival for AIM Participants and Comparators



Descriptive Characteristics, All Beneficiaries. Exhibit AIM.5 displays the descriptive characteristics of beneficiaries in the treatment and comparison groups, with respect to demographics, comorbidities, and prior utilization.[240] AIM participants are more likely to be younger (no more than 70 years) and older (at least 90 years of age), less likely to be Medicare-eligible due to age, and more likely due to disability. AIM participants also have more comorbidities (higher risk scores). There are statistically significant differences in the prevalence of several comorbidities (chronic kidney disease, CHF, COPD, stroke/TIA, lung cancer, anemia). These differences likely contribute to differences in prognosis between treatment and comparison group members that would bias our findings, providing further evidence of the observed differences between the two groups in probability of survival, presented above.

Exhibit AIM.5: Descriptive Characteristics for AIM and Comparison Group Medicare Beneficiaries

Variable	AIM	Comparison
Number of Beneficiaries	4,316	3,072
Mean Number of Quarters Enrolled [Range]***	3.9 [1-13]	8.9 [1-13]
Gender % (N)		
Female	55.5 (2,395)	56.2 (1,725)
Age Group % (N)**		
<70 years	20.6 (890)	18.2 (559)
70-74 years	12.0 (518)	12.8 (392)
75-79 years	13.1 (566)	14.7 (452)
80-84 years	16.3 (705)	17.2 (529)
85-89 years	18.4 (796)	19.4 (597)
90+ years	19.5 (841)	17.7 (543)

[240] We test differences between the two groups with a t-test for continuous measures (comorbidities, mean utilization, and cost) or a chi-square test for categorical parameters (gender, age group, race/ethnicity, dual eligibility, coverage reason, HCC Score).

Variable	AIM	Comparison
Race/Ethnicity % (N)		
White	76.2 (3,288)	75.5 (2,320)
Black	10.3 (443)	10.7 (330)
Asian	5.8 (248)	6.1 (187)
Hispanic	3.5 (151)	3.1 (96)
Other	4.3 (186)	4.5 (139)
Dual Eligibility % (N)		
Dually eligible	26.3 (1,134)	26.6 (817)
Coverage Reason*		
Age	78.2 (3,375)	79.4 (2,439)
Disability	20.4 (879)	18.6 (572)
ESRD	0.6 (25)	0.6 (19)
Disability and ESRD	0.9 (37)	1.4 (42)
Hierarchical Chronic Conditions (HCC)		
Mean Charlson Score (Standard Deviation)***	3.05 (1.73)	2.75 (1.80)
Mean HCC Score (Standard Deviation)***	4.07 (1.84)	3.73 (1.95)
Comorbidities % (N)		
Chronic Kidney Disease**	62.2 (2,685)	59.6 (1,831)
Congestive Heart Failure**	57.3 (2,472)	54.6 (1,678)
COPD***	39.3 (1,698)	34.0 (1,045)
Hip Fracture	3.9 (169)	3.4 (104)
Stroke/Transient Ischemic Attack*	15.1 (650)	13.7 (420)
Breast Cancer	7.4 (321)	7.4 (226)
Colorectal Cancer	5.4 (233)	4.9 (151)
Lung Cancer***	8.6 (373)	6.1 (187)
Anemia***	69.0 (2,978)	65.1 (2,001)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD)*	$61,149 ($52,867)	$59,015 ($55,600)
Hospitalizations (SD)***	2,194 (1,620)	2,018 (1,718)
ED Visits (SD)	1,490 (2,604)	1,468 (6,090)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Quality of Care (Qualitative Findings)

During NORC's two site visits (2014, 2015), we convened three focus groups consisting of caregivers and AIM-enrolled beneficiaries, to document perceptions and beliefs related to participation in AIM. Respondents gave high marks to the AIM program, as described below.

Timeliness of Services Delivery. Participants and caregivers praised the AIM program and reported that the home visits and triage hotline for after-hours and weekend care were the most helpful in their daily lives.

Beneficiary Experience and Satisfaction. Consumers report strongly positive feelings of confidence and security that AIM staff would provide support when needed. While NORC did not field a participant satisfaction survey, Sutter Health surveyed 1,304 participants in Year 3 of the intervention. Self-reported results from the survey indicate high participant satisfaction with the intervention.

"The communication has been excellent with the AIM team, the tablet, the ability to have recorded their goal setting for the next visit. It's communicated to the next person who visits. Scheduling, someone calls the night before. We have PT, OT, social work, and RN. The RN will tell me when they call the doctor and call me back. Lab tests are done frequently. But there are no gaps where I have to call and ask what happened. I get fast replies. And they get better reply time then when I call. Doctors get that the nurse has made a professional evaluation and they are credible to the doctors…they are very clear on what is happening during the visit and what will happen in the next visit. Now my husband can get to the doctor and we have so many specialists…I have to work with the AIM nurses on who we need to get to first and prioritize…I haven't found any lapse in communications. It's better than when I tried to do it on my own." –Focus Group Respondent (Caregiver)

Informal (Family) Caregiver Experience and Satisfaction. Caregivers are generally satisfied with the support they received from AIM. They note that the program helped them access more immediate care and more information about services, including hospice.

Workforce Development

Staffing

AIM is implemented by a team that includes nurses based at hospitals (where they make referrals and conduct assessments); nurses who provide telephone intake and support; teams of nurses and, less frequently, social workers who visit patients at home; and primary care physicians who make referrals. The program is almost entirely nurse-staffed and nurse-managed. A physician certified in palliative medicine serves as the AIM Medical Director, participating in case conferences and in consultations with the nurses, as well as phone consultations with community physicians. A team care coordinator, a clinical nurse specialist, and a program leader support each AIM team; they provide centralized referrals and intake, after-hours nurse triage service (in an early stage of implementation at the time of the NORC site visit), and program administration. AIM leaders have described changes in the final year of HCIA support, including using an expanded time horizon for staffing a new site; creating a new role (clinical nurse specialist) to add in-depth expertise related to palliative care and quality of care for sites that are not led by a nurse; and the leveraging of staff across AIM locations to enable smaller AIM sites to have full staffing for each AIM-specific role.

"It is more advantageous to have a home health nurse but the hospice nurse may be more talented with communicating with end stage disease patients. It is acutely beneficial to have a mix because a home health nurse is more inclined to go after improving health status, while the hospice nurse is used to maintaining health or working on psychosocial issues." –AIM Administrator

Training

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact. How did the training affect the participants? The patients? The awardees?
Level 4: Impact. What benefits resulted from the training?

Sutter Health has made a substantial investment in training that is formally documented, tested, and reproducible. AIM's training program includes one-time classroom and web-based didactic instruction, coordinated with position-specific training for hires new to Sutter Health, as well as continuing education, experiential training, and periodic competency testing. Training preceptors are based at each site. Groups of AIM team members (e.g., nurses, social workers) are trained at the same time, at the same location, and with the same materials.

We present findings from NORC's workforce trainee survey (n=125) in our Second Annual Report to CMMI (2016). In this section, we revisit and summarize these descriptive findings, evaluating the impact of Sutter Health's staff development using the Kirkpatrick rubric for assessing training program effectiveness.[241] The scope of our evaluation encompasses Kirkpatrick Levels 1 and 2, with limited attention to Level 3.

Trainee Background. Forty-two percent of respondents were employed by Sutter Health or an AIM project partner prior to the start of the AIM project, while 58 percent were new-hires. Nurses are central to the AIM program and are the single largest group of respondents (64 percent), followed by social workers (13 percent). About half have a four-year college degree (52 percent) and one quarter (25 percent) have attained at least a master's degree. Respondents are mostly female (83 percent), White (49 percent), or Asian (22 percent), with an average age of 46 years and an average of 13 years of clinical experience.

Staff Tasks. While most intervention-related tasks are performed by both nurses and social workers, there are clear differences in roles: nurses are more likely work on symptom and disease management, medication management, and intake screening (a role exclusively for nurses), while social workers are more likely to conduct home visits and referrals.

Satisfaction (Reaction to Training). Almost all respondents (96 percent) acknowledge participating in the four-day introductory training, and all find it to be moderately to very useful. Specific aspects of training that receive high marks include "informal conversation as needed" (89 percent), with similar high enrollment and regard for training on the EHR system (90 percent). In general, respondents describe training in symptom management (19 percent) and preceptorships (19 percent) as the most useful, followed by weekly team meetings (13 percent). While nurses are more likely to report preceptorships and symptom management training to be the most useful, social workers identify training in advance care planning (27 percent) and motivational interviewing (27 percent) as the most useful.

[241] See Appendix F for the complete set of survey findings, reproduced from NORC's Second Annual Report to CMMI.

Learning From Training. Most respondents (83 percent) agree that the trainings prepared them for various aspects of their jobs with AIM, especially for implementing services as intended (87 percent) and meeting their patients' needs (86 percent). Most agree that the trainings prepare them to work as a team (82 percent) and use the technology needed on the job (76 percent).

Implications for Workforce Development

Teamwork and Feedback on Performance. Most respondents agree that the information they provide to their team has an impact on clinical decision-making (84 percent), and that their participation in team-based care has a positive impact on patient quality of care (94 percent). Contacts with peers and preceptors are cited most often as being very helpful, although respondents are less likely to have interactions with preceptors (66 percent) than with peers (94 percent); trainers, direct supervisors, and AIM program leaders are less often described as being very helpful (56 percent, 59 percent, and 49 percent, respectively). Over 80 percent of respondents indicate that their supervisors or managers provide suggestions and support on behaviors they can improve, and assist with problem-solving or advice; 70 percent say that their supervisor or manager offers feedback on what they were doing well. Three-quarters of respondents agree or strongly agree that they get the help and support they need to do their job.

Satisfaction. When asked to assess the balance between stress and reward in their role at AIM, respondents most often describe their work as both moderately stressful and highly rewarding (30 percent). Almost half (46 percent) indicate that work-related stress increased after becoming an AIM staff person, while 26 percent note a decrease in stress and 22 percent report no difference. Overall, most respondents (79 percent) express satisfaction with their employment as part of AIM, with the highest satisfaction related to the level of autonomy (82 percent) and the quality of care provided to patients (81 percent), and the lowest ranking given to work/life balance (57 percent). Fifty-four percent note that they want to stay at their job in the next year, a general measure of satisfaction.

> "Patients are grateful to have us to work through their issues, educate them about disease, be a bridge between them and the doctors. I think it is the best job I have ever had." – Respondent, Trainee Focus Group

Context: AIM in Its Third Year

External Factors. A fundamental aspect of Sutter Health's implementation experience has been developing management and staffing solutions that enable fidelity to the AIM model, whether replicated under the auspices of a home health agency or a hospice—each with separate state licensing and regulatory requirements—and whether hosted by a Sutter hospital or a non-Sutter partner. In addition, despite the implementation of a warehouse with tools to facilitate standardized data collection, analysis, and dissemination of performance metrics on a weekly basis, the reach of this infrastructure is limited outside of Sutter Health. It requires reliance on duplicate data entry or fax transmission of hard copy records to non-Sutter providers or partner agencies, making the sharing of patient data more challenging.

Organizational Diversity in AIM Sites

Ownership
- Sutter Care at Home (11 sites)
- Hospital (1 site)
- Medical Group (1 site)

Operations
- Hospice & Home Health (matrix reporting across organizations; 8 sites)
- Home Health only (5 sites)

Internal Factors. Sutter Health's organizational capacity as a regional health care system, and its commitment of considerable resources to AIM (project leaders estimate over $21 million) has played a significant role in the program's success. Project leadership has leveraged existing staff training and site-specific operational resources to design an AIM model that is tailored to participant needs and organizational resources at a site, while maintaining fidelity to the program model.

Sustaining and Replicating the AIM Program

NORC's Second Annual Report to CMMI (2016) documents the awardee's plans as of spring 2015; there has been little change noted in program documents for the last 90 days of initial performance period under HCIA One funding (April 1 through June 30, 2015), or in the awardee's final performance report (September 28, 2015).

Sustainability. Sutter Health plans to sustain the AIM model at all sites in the period after HCIA One funding, tapping internal funds and actively seeking additional reimbursement through contracts with commercial payers and grant-based or foundation support. Plans also include continuing to refine operating protocols and a payment model for AIM, e.g., through a new project under the aegis of the Coalition to Transform Advance Care.

"We are growing and looking for sustainable payment structures. ACO and managed care is growing. Sutter is filing to become a Medicare Advntage plan. About 25 percent managed care patients in AIM, in the next year or two, that will grow to around 50 percent. We accept all payers." –AIM Project leadership

Replicability and Scaling. From project leadership's perspective, the replication of the evidence-based AIM model under HCIA funding has been an operational success, and has achieved positive outcomes for enrollees and staff. Further replication and scaling has been planned on a number of fronts, including scaling elements of the AIM model throughout the Sutter Health system (for participants beyond those with late-stage illness); disseminating the AIM model through outreach to health care systems nationally and the development of related resource materials, such as business plans; and through ongoing contact with CMS, to explore expanded testing of payment models for AIM under Medicare at the regional and national level.

Summary

There are statistically significant cost savings and reduced likelihood of hospitalization for AIM-enrolled beneficiaries during the last 30 days of life, although as a group, these beneficiaries are more likely to visit an ED than are matched controls. The awardee's final report to CMMI reviewed self-monitoring that notes an increased frequency of ED visits, which are seen as reflecting the need to communicate more effectively with enrollees and their caregivers about how to contact AIM with concerns, particularly after-hours and on weekends, and about how to manage symptoms at home, rather than calling 911. NORC's analysis of experiences during the last 30 days of life has limitations related to use of a cross-sectional design, the relatively short time period (30 days), and differences between AIM-enrolled and control beneficiaries that may confound the analysis, for example, unobserved variation in frailty or physical functioning that results in comparators who are healthier than AIM enrollees.

The difference in results between our claims-based analysis for all AIM-enrolled beneficiaries and for people enrolled for the last 30 days of life emphasizes the importance of creating a comparison group that is as similar to the treatment group as possible. For both analyses, we achieved good balance in measured covariates that included a range of comorbidities and a risk score (Charlson Comorbidity Score) that predicts the likelihood of death at one year, matching the formal criteria for AIM program eligibility. However, residual confounding still exists, as a survival analysis finds more than a threefold greater likelihood of death after nine quarters of enrollment for AIM-enrolled beneficiaries, compared with comparators observed over a similar time period. Bias likely stems from our inability to recreate by means of claims, in the comparison group, the actual criteria used to enroll participants in AIM.[242] Our findings from the end-of-life analysis appear to be less biased, given the greater similarity between treatment and comparison group characteristics.

Sutter Health's overall strategy of remaining flexible in how it organizes an intervention site—in terms of collaborators, laws, and regulations to consider—while maintaining fidelity to the program model makes the AIM program a promising candidate for adaptation in different contexts that account for local factors, such as payer mix, state/geography, and organizational partners.

References

HCIA Final Performance Progress Report. Submitted by Sutter Health, 9/28/15.

HCIA Narrative Progress Report for Sutter Health, for Reporting Quarter End Date 6/30/2015. Submitted by Sutter Health, 07/31/2015.

HCIA Quarterly Report (Submitted) for Sutter Health, for Reporting Quarter End Date 6/30/2015. Submitted by Sutter Health, 7/31/2015.

[242] A medical record review would be one alternative to attain a more comparable cohort for this intervention, since we were unable to identify a cohort in claims for the pre-hospice period. Additional strategies, such as selecting comparisons based on prospective survival (e.g., sampling among those who died or were placed in hospice) are likely to add bias to the estimates and limit interpretability of the findings.

University Emergency Medical Services

Better Health through Social and Health Care Linkages beyond the Emergency Department (HealthiER). Community health workers recruit participants among non-urgent hospital emergency department (ED) patients and primary care settings, providing weekly, one-on-one coaching to facilitate patient-directed goal-setting, navigation and referrals to community supports, and connection to primary care.

PROGRAM MODELS: Beneficiary/ Caregiver Engagement, Care/Case Coordination, ED Diversion, Patient Navigation

LOCATION: Buffalo, NY

GRANT: $2,570,749

AWARD DATES: 12/27/12 to 6/30/16
NO-COST EXTENSION: 7 month, full program
PAYER(S): Medicaid

REACH: 1,739 beneficiaries (72% of target)
POPULATIONS: Adults, Behavioral Health/Substance Abuse, Disability, Racial/Ethnic Minorities, Urban
DATA: Medicaid claims (1/11-12/13), Awardee Participant Survey; site visit (5/14); telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Challenge of integrating community health workers (CHWs) into hospital ED workflow addressed by adding CHW placements into more holistic, primary care clinic settings.
- CHWs developed capacity to adapt in rapid cycle environment.

WORKFORCE

- Team of 10 CHWs supervised by social workers.
- Competency-based training with formal curriculum, together with on-the-job experience and mentoring.
- Modified training from focus on classroom lecture to be more experiential.

CONTEXT

- Close and sustained partnership with independent rapid cycle evaluator leverages awardee capacity for midstream adaptation.
- Community Foundation of Western NY supported professional development and independent rapid cycle evaluation.

OUTCOMES§

COST

- Decrease in total quarterly cost of care, (-$717 per beneficiary)

UTILIZATION

- Decrease in quarterly hospitalizations (-15 per 1,000 beneficiaries) and ED visits (-143 per 1,000 beneficiaries)

QUALITY

- Decrease in practitioner follow-up visits per quarter at 90 days after an ED visit (-69 per 1,000 beneficiaries), likely reflecting difficulty in securing timely primary and specialty care appointments

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

HealthiER is being sustained at the original intervention site, with an emphasis on hospital ED and primary care recruitment and a more narrow focus on the CHW role on patient navigation. Erie County Medical Center (ECMC) is expected to continue subsidizing provider involvement.

REPLICABILITY & SCALING

Under New York State's Delivery System Reform Incentive Payment program (Millennium Collaborative Care)—part of a section 1115 Medicaid waiver—HealthiER is being scaled to seven sites in addition to ECMC. The modified version is known as the Emergency Department Care Triage project; the UEMS team has had a major role in scale-up planning and implementation.

§Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and are statistically significant at the $p<0.10$ level or greater. The chapter that follows includes focus group and survey findings about quality of care and health that have been documented by the awardee and its independent evaluator, the University of Colorado; only findings that represent NORC's original analyses are presented in this front page summary.

Overview of the HealthiER Program

Background. University Emergency Medical Services (UEMS) provides contract clinical services to Erie County Medical Center's emergency department (ED), based in Buffalo, New York. UEMS designed and tested a new model to divert adult Medicaid beneficiaries who present at the ED with non-urgent concerns (high-utilizers). This model was developed by project leadership, based on their previous work together at the county health department, and with mentoring and other supports offered by the Community Foundation of Western New York. HealthiER uses teams of community health workers to recruit participants at the Erie County Medical Center (ECMC) ED, as well as affiliated hospital outpatient and community clinics, to develop patient-directed service plans and coaching to achieve one or more goals, including connection to primary care and outpatient specialty care, over three to four months.

Goals. Although UEMS shares CMMI's interest in reducing hospital admissions and providing high-value care, the awardee has identified objectives related to community health worker efficacy in engaging with a high-risk population.

Program Models and Practices. The awardee has created a new model that relies on community health workers (CHWs) to recruit and engage with high-risk beneficiaries holistically, in a setting (the hospital ED) that is not organized around prevention or primary care. Using CHWs to coordinate care and assist beneficiaries in navigating the health care system is not new, but the ED setting has posed a difficulty for the CHWs in becoming part of the day-to-day operations; midstream modification of HealthiER to rely more on referral partnerships with clinics and to co-locate CHWs with affiliated primary care practices has appeared to be more successful. Once a beneficiary has agreed to work with HealthiER, a CHW delivers one-on-one coaching to identify a goal and to motivate the beneficiary to make progress toward that goal on a weekly basis. As the model has been adapted for sustainability by Millennium Care—a successor host to UEMS—it has been narrowed from a broad, goal-setting exercise to a focus on navigation and care coordination.

Implementation Updates. Key developments related to implementation since the preparation of NORC's Second Annual Report to CMMI (2016) include the following:

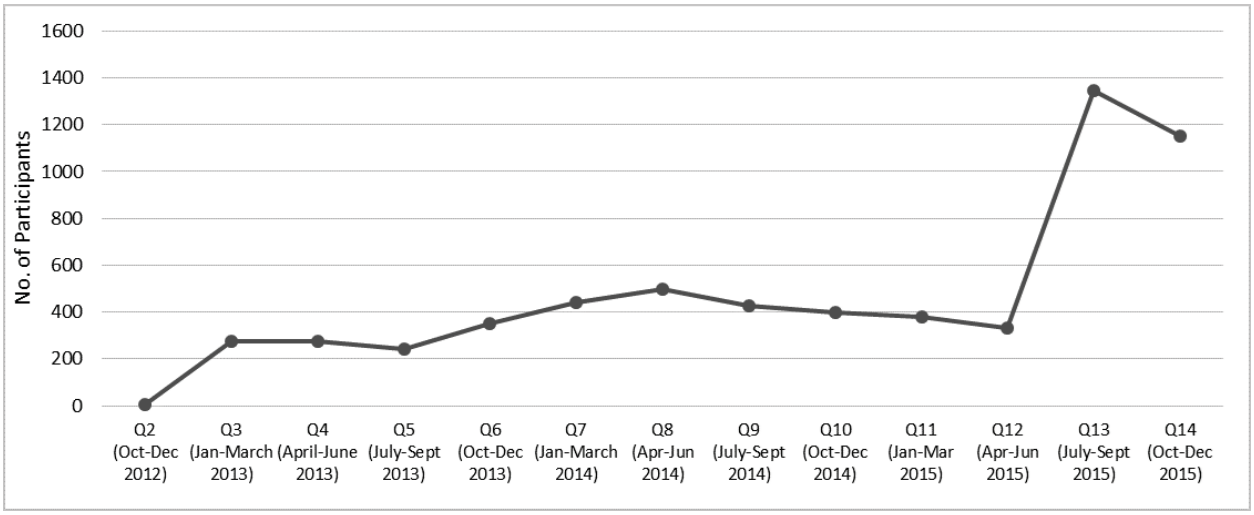
- **Program Model Change to ED Triage.** During the NCE period, a primary focus has been on transition, modifying the HealthiER model as it moves from sponsorship by UEMS at ECMC to the Delivery System Reform Incentive Payment (DSRIP) host organization—Millennium Collaborative Care—and replication at a number of sites in western New York. While staffing with CHWs will continue and beneficiary recruitment has been refocused on hospital EDs (rather than primary care clinics), the scope of CHW tasks has been narrowed considerably, and the timeframe of beneficiary engagement shortened from three to four months to weeks. The ED Triage CHWs will function as patient navigators for enrollees after discharge from an ED visit. The short-term nature of the ED Triage model is intended to dovetail with Medicaid Health Homes. There is much less emphasis on coaching. HealthiER project leadership has found conveying lessons learned from HealthiER's demonstration supported by HCIA to be challenging.
- **Shift of Health IT Platform.** Early in implementation (April 2013), UEMS created Circe, a web-based EHR for case management, tailored to HealthiER and based on SalesForce; Circe has been expanded as part of the transition to the ED Triage project.

- **New and Strengthened Partnerships.** HealthiER relied heavily upon partnerships with other organizations to meet participant needs. This included primary care providers, behavioral health and substance abuse providers, Medicaid Managed Care Organizations, and community-based organizations. In the final months of implementation and into the NCE, partnerships with two organizations were particularly important: Medical Answering Services (MAS), the NYS vendor for Medicaid transportation; and Medicaid Health Homes, sponsored by Medicaid health plans, to which HealthiER referred patients for longer-term case management.

Through implementation and into the NCE period, UEMS demonstrated a strong capacity to adapt changes midstream, for example, in its hiring and training of CHWs, and its shift from the loss of one original site (Buffalo General Hospital) to the development of referral partnerships with primary care clinics.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from UEMS provide participation by HCIA reporting quarter, as seen in Exhibit UEMS.1. There was a gradual increase and then a leveling of enrollment over the initial performance period (through Q12), followed by a marked increase in enrollment during the NCE period (Q13 and Q14). During the most recent quarter for which data are available (October 1 through December 31, 2015), the awardee reports serving 1,151 beneficiaries. For those participating in HealthiER during the period from October 1 through December 31, 2015, eighty percent of participants are between the ages of 26 and 64, 16 percent are ages 19 to 25, and less than 3 percent are either adolescents ages 12 to 18, or elders at least 65 years of age. Most participants are female (55 percent). Over half are African American (58 percent), 30 percent are White, and 3 percent are Hispanic or Latino.

Exhibit UEMS.1: Total Number of HealthiER Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

The HealthiER program is associated with significant reductions in total cost of care, hospitalizations, and ED visits for Medicaid beneficiaries but does not have an impact on potentially avoidable hospitalizations. However, there are significantly fewer practitioner follow-up visits within 90 days after an ED visit, indicating diminished access to care for enrollees, relative to the comparison group. This likely reflects the difficulties that program staff had experienced in trying to arrange for timely follow-up care with hospital-affiliated outpatient clinics.

In the section below, we present our analyses of program effectiveness, based on three types of data: Medicaid claims; findings from UEMS' internal survey of participants, conducted by independent evaluator the University of Colorado; and narrative from NORC interviews and one site visit.

Core and Supplemental Measures

Our community (ambulatory care) analysis compares the experiences of UEMS enrollees with a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's HealthiER program over the enrollment period as a whole and in each quarter of enrollment. Our analysis is for Medicaid beneficiaries, who comprise all of HealthiER's enrollees.[243]

Measures (per 1,000 beneficiaries unless noted)
- 90-day Total Cost of Care per beneficiary
- 90-day Hospitalizations
- 90-day ED Visits
- Practitioner Follow-up within 7, 30, and 90 Days post-ED Visit
- Potentially Avoidable Hospitalizations

Finder File and Creation of Analytic Sample. UEMS provided a finder file of 1,736 unique program participants and enrollment dates, enabling us to use Alpha-MAX Medicaid claims for these beneficiaries to calculate outcome measures.[244] We matched 1,736 unique program participants, of which 1,712 had a valid social security number (SSN). Of these, we succeeded in linking 1,487 participants to New York Alpha-MAX records, and 1,232 participants were enrolled in the HealthiER program before December 31, 2014. We excluded participants from the analysis if they were not enrolled in Medicaid when they enrolled into HealthiER (n=224), and if they were dually eligible for Medicaid and Medicare (n=169); this yielded an analytic sample of 839 Medicaid beneficiaries.

Comparison Group. The comparison pool consists of Medicaid beneficiaries, age 18 and older, residing in the Utica or Rochester zip code areas. We specifically sampled from the Utica and Rochester areas due to concerns about saturation of the HealthiER program in the Buffalo area. From this pool, we selected beneficiaries who had an ED visit in 2012, set this as the index date, and required that they also have at least two other ED visits in the year prior to their index date. Comparators also needed to be enrolled in Medicaid and not dually eligible. We use propensity score matching to find appropriate comparators.[245] The final propensity score model includes disability status, enrollment in a managed care plan, and

[243] Estimated percentage of Medicaid participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[244] For the time period January 1, 2011, through December 31, 2014.

[245] For more information on propensity score matching, please refer to Appendix C.

Chronic Illness and Disability Payment Score (CDPS) risk score. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching greatly improves comparability.[246]

Descriptive Characteristics. Exhibit UEMS.2 displays the descriptive characteristics of Medicaid beneficiaries in the treatment and comparison group, with respect to demographics, comorbidities, and prior utilization.[247] The comparison and intervention groups are similar in terms of age, race, and gender, as well as prior utilization and cost. However, we observe some significant differences in ethnicity, comorbidity, and enrollment in a managed care plan.

Exhibit UEMS.2: Descriptive Characteristics for HealthiER and Comparison Group Beneficiaries

Variable	HealthiER Participants	Comparison
Number of Beneficiaries	839	839
Mean Number of Post-Enrollment Quarters [Range]	4.4 [1-9]	4.4 [1-9]
Age % (N)		
18-29 years	33.5 (281)	34.2 (287)
30-39 years	20.3 (170)	18.4 (154)
40-49 years	20.5 (172)	21.1 (177)
50-59 years	19.8 (166)	18.7 (157)
≥60 years	6.0 (50)	7.6 (64)
Race/Ethnicity % (N)		
White	18.6 (156)	18.4 (154)
Hispanic***	3.8 (32)	10.5 (88)
Gender % (N)		
Female	57.8 (485)	57.1 (479)
Medicaid Plan % (N)		
Enrolled in a managed care plan***	81.1 (680)	88.9 (746)
Disability Status % (N)		
Disability*	26.5 (222)	30.6 (257)
Chronic Illness and Disability Payment System (CDPS)		
CDPS Risk Score (SD)**	2.1 (2.2)	2.3 (1.8)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicaid Cost (SD)	$8,656 ($14,313)	$9,245 ($14,391)
Hospitalization (SD)	545 (1,862)	572 (1,168)
ED Visits (SD)	4,757 (8,822)	4,961 (8,786)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of HealthiER. Exhibit UEMS.3 displays the average quarterly and aggregate impact of HealthiER on its participants relative to a matched comparison group.[248] We report utilization measures as binary

[246] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[247] We test differences between the groups with 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).

[248] Models are adjusted for enrollment in a managed care plan, disability, and CDPS risk score.

indicators, noting whether or not any event occurred in each quarter of a beneficiary (beneficiary-quarter).[249] We find the following for the HealthiER program, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$717 per beneficiary).
- **Utilization Measures:** A significant decrease in hospitalizations (-15 per 1,000 beneficiaries) and emergency department (ED) visits (-143 per 1,000 beneficiaries).
- **Quality of Care Measures:** A significant decrease in practitioner follow-up visits within 90 days after an ED visit (-69 per 1,000 beneficaries).

Exhibit UEMS.3: Impact of HealthiER on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per Beneficiary ($)	**-$717 [-$883; -$550]*** **
Hospitalizations	**-15 [-31, 0]***
ED Visits	**-143 [-166, -121]*** **
7-day Practitioner Follow-up	-8 [-24, 39]
30-day Practitioner Follow-up	7 [-31, 45]
90-day Practitioner Follow-up	**-69 [-108, -30]*** **
Potentially Avoidable Hospitalizations	2 [-6, 9]
AGGREGATE IMPACT[§§]	
Outcome Measure (per 1,000 Beneficiaries unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$2,647,775 [-$3,263,260; -$2,032,290]*** **
Hospitalizations	**-57 [-113, -1]***
ED Visits	**-529 [-613, -445]*** **
7-day Practitioner Follow-up	28 [-90, 145]
30-day Practitioner Follow-up	26 [-113, 165]
90-day Practitioner Follow-up	**-255 [-400, -111]*** **
Potentially Avoidable Hospitalizations	16 [-20, 33]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]The average quarterly DID estimate per quarter of program implementation. The total DID estimate for all program participants across all quarters of program implementation. [§§]Aggregate Impact is estimated for this awardee based on the total number of program participants (839) and average length of participant enrollment in program (4 quarters).

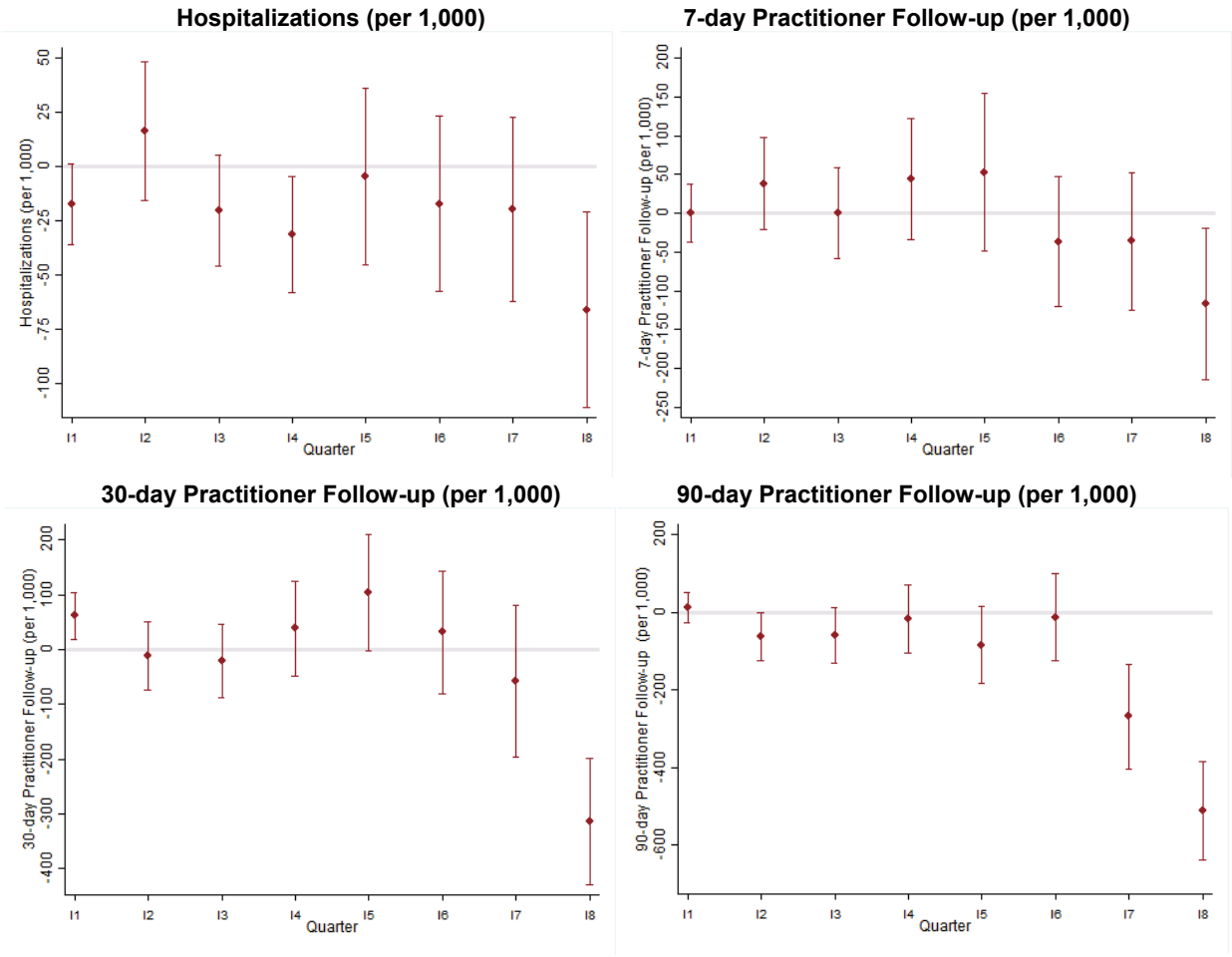
Impact of HealthiER Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact on each intervention quarter for total cost of care, ED visits, and potentially avoidable hospitalizations are consistent with the average quarterly impact summarized above; please see Appendix D for these results. For hospitalizations, 30-day readmissions, and practitioner follow-up visits, findings differ from those presented above as shown in Exhibit UEMS.4.[250] We find the following, relative to the comparison group:

[249] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

[250] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1–I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. For the graphs, we excluded the I9 period due to small sample size and wide confidence intervals. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

- **Utilization Measures:** A reduction in hospitalizations across most quarters and statistically significant reductions in three post-interventions quarters.
- **Quality of Care:** An increase in practitioner follow-up 7 days and 30 days after ED visits during early post-intervention quarters, with a dip beginning around quarter I6.

Exhibit UEMS.4: Impact of the HealthiER Program on Outcomes, by Quarter



Quality of Care and Health (Survey and Qualitative Findings)

NORC's evaluation uses qualitative data from one site visit and a series of telephone interviews, as well as the awardee's internal survey data and findings shared by UEMS's independent evaluator, the University of Colorado, to assess the impact of HealthiER on quality of care. The evaluation measures timeliness of services delivery, beneficiary experience, and satisfaction. The University of Colorado shared findings from its two focus groups (n=8) conducted with HealthiER beneficiaries in summer 2014, as well as analysis of the awardee's own survey data.[251]

[251] University of Colorado, unpublished results of Patient Focus Group.

Timeliness of Services Delivery. Focus group participants credit HealthiER's CHWs with enabling more timely access to follow-up primary care provider appointments, which is an important outcome for the program. At the same time, most report that enrollment in HealthiER has not changed their relationship with the health care system. The University of Colorado's survey results reinforce the finding of improved access to care, with a statistically significant increase in the percentage of respondents (n=144) who identify themselves as having a primary care provider, from 67 percent at baseline to 93 percent at most recent follow-up ($p<0.001$).

Beneficiary Experience and Satisfaction. While focus group participants express some confusion about the goals of the intervention, the range of services offered, and expectations of the CHWs, they do express satisfaction with HealthiER. As the University of Colorado summarizes its findings, "Many patients appear to have formed important relationships with their CHWs, and reported perceived benefit from having someone to talk to, a rarity in their other encounters with the health care system. Patients reported feeling like they were truly listened to and heard by their CHWs. They also appreciated follow-through, reliability, persistence, and honesty when CHWs were unable to address particular concerns." The patient satisfaction survey fielded by the University of Colorado (n=133) used a six-item version of the Health Care Climate Questionnaire to measure how respondents perceive the degree of a CHW's support for an enrollee's autonomy, together with a two-item patient satisfaction component. Ranking satisfaction on a scale of 1 (strongly disagree) to 7 (strongly agree), respondents on average strongly agree that their CHW enabled greater autonomy (mean score of 6.77, with SD=0.57), and that they like their CHW and that their CHW helped them (mean score of 6.87, with SD= 0.48).[252] It is important to note that there is no baseline data with which to compare these scores.

Health Care Climate Questionnaire items

- I feel that my CHW has provided me choices and options.
- I feel understood by my CHW.
- My CHW conveys confidence in my ability to make changes.
- My CHW encourages me to ask questions.
- My CHW listens to how I would like to do things.
- My CHW tries to understand how I see things before suggesting a new way to do things.

Health. NORC's assessment of HealthiER's impacts on health uses findings reported by the University of Colorado was based on an assessment of patient-reported outcomes measures, as described above. Participants were asked to complete a short assessment of health (SF-12 survey) at enrollment and at follow-up six weeks post-enrollment; more than one follow-up survey may have been administered and the most recent one is used for the purpose of a pre/post comparison. For those with both baseline and at least one follow-up (n=70), there is a statistically significant increase in mean score, from 40.5 (SD=11.3) to 44.1 (SD=9.7).[253]

[252] University of Colorado, unpublished results of HealthiER Patient Satisfaction Survey. Email, Bethany Kwan to NORC, 8/24/15.

[253] University of Colorado, unpublished results of SF-12 version 2. Email, Bethany Kwan to NORC, 8/24/15.

Workforce Development

Over the three years of implementation, UEMS maintained its initial staffing model. It used a team of community health workers who were trained and supervised by two social workers and overseen by a project director with a social work background. However, project leadership identifies two waves of CHW hires; when the first group of CHWs was not judged to be successfully implementing the model, project leadership moved to fire these initial hires and recruit a second group of CHWs. In HealthiER's third year (2014-2015), CHWs were placed in outpatient primary care settings for the first time, in addition to placement in the ECMC ED. This facilitated a more holistic model of care coordination than had been achieved when CHWs were placed only in an ED setting. In addition, during the NCE year, part of the transition from the HealthiER model to the ED Triage Project involved narrowing the scope of duties for CHWs—from broad-based, patient-directed goal setting and coaching, to helping participants navigate and strengthen their connection with primary care providers.

> "There was significant variation in work from one CHW to the next about what barriers were being addressed. And it was less about patient need and more about CHW preference. So those more comfortable in social service sector tended to focus on those areas and those more comfortable in the medical or clinical would focus there…it was hard to direct them to cover all the areas required. So narrowing the scope is the only way to get that done. And according to research and literature, the most successful CHW programs have a more narrow scope than our original plan." –UEMS Project Leadership

Training. Over the course of implementation, training has shifted from an initial commitment to formal didactic instruction toward a more experiential approach with shadowing for recent hires. All hires participate in a 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 a written test and observation by supervisors, who are master's level social workers.

Implications for Workforce. Project leadership emphasizes the importance of HealthiER in expanding the vision for the role of CHWs. This has been a basis for the continued involvement of the Community Health Foundation of Western and Central New York in supporting the demonstration, and a focal point for the University of Colorado. Project leadership also notes that sustainability and scaling under the new ED Triage Project resulted in two types of challenges for CHWs as a profession: (1) they are now employed directly by the hospital ED in which they work, which creates new incentives for other members of the ED clinical and discharge planning team to work collaboratively with their CHW partner; and (2) each hospital site has the flexibility to determine what type of lay health worker to hire, and is not required to hire a CHW. The decision to move forward with orienting staffing toward task, rather than professional role and training (e.g., CHW), may not result in new jobs for CHWs, but does acknowledge the value of clearly defined tasks for CHWs as part of clinical teams involved in care coordination and patient engagement.

Context: HealthiER in its Third Year

As noted in NORC's Second Annual Report (2016), ongoing Medicaid delivery system reform at the state and regional level has influenced modification of the HealthiER model. During the final year of first-round HCIA support and into the NCE, the UEMS leadership team has acted strategically and successfully to integrate HealthiER into Medicaid delivery system reform through New York's DSRIP.

External Factors. A critical measure of the awardee's success in sustaining and scaling its intervention is that New York State's DSRIP (Millennium Collaborative Care)—part of an 1115 section Medicaid waiver—includes a provision to scale the modified HealthiER intervention to a total of 10 sites, including the 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. Ongoing partnerships with primary care providers, transportation services, and other community supports, as well as with Medicaid health plans involved in Health Home delivery system reform, have supported HealthiER in its ability to participate successfully in the design and launch of model scaling under DSRIP.

Internal Factors. During the NCE and transition of the HCIA-funded HealthiER model to implementation under the aegis of Millennium Collaborative Care, the ongoing involvement of UEMS's management team has been critical to successful scaling. In addition, the ongoing work of independent rapid-cycle evaluator, the University of Colorado, has continued to support ongoing learning by the project team based on its implementation experience with HealthiER.

Sustaining, Replicating, and Scaling the HealthiER program

Sustainability. The modified version of HealthiER, the ED Triage Project, will be sustained by a new organization, Millennium Collaborative Care, as described above. The awardee expects that the Erie County Medical Center will continue to subsidize primary care provider participation. A modified version will be sustained at the original site and will expand to seven to nine 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, the role of CHWs will be changed to that of patient navigation.

> "It shifted from being a broad scope of services to a broader reach of services. It was a narrower set of functions, but it was going to be deployed to ten hospitals throughout the region. Within each hospital, the way it was designed, each hospital created a team of CHWs/patient navigators, the title was not restrictive…based on the funding that was provided from DSRIP to the hospital…many of the hospitals had pretty rigid unions or other limitations that just having a CHW and having it required for every setting was not particularly attractive to many hospitals. We tried to do this with as much flexibility as we could." –UEMS Project Leadership

Replicability and Scaling. As described above, elements of the HealthiER model have been replicated and scaled to additional sites through the region, as part of New York's DSRIP.

Summary

Our results suggest that the HealthiER program is effective in reducing hospitalizations, ED visits, and total cost of care, but has little impact on potentially avoidable hospitalizations. We also find that the program may result in a decrease in practitioner follow-up after ED visits. This finding is counterintuitive to program goals, but may be a result of the significant ramp-up period needed to get the program off the ground. In addition, our understanding from interviews with awardee leadership and a review of program records is that UEMS had continued difficulties arranging for timely follow-up by primary care and outpatient specialty practitioners, due to partner ECMC's insistence that the CHWs refer enrollees to ECMC-affiliated clinics, despite considerable wait lists.

As Alpha-MAX claims are currently only available through December 2014, we are able to evaluate the program only for approximately half of the participants enrolled, and only up to nine quarters of enrollment (average of 4.4 quarters). We were able to select fairly well matched comparisons in Alpha-MAX data in similar geographic areas; however, comparisons were more likely to be enrolled in a managed care plan and have a higher CDPS score than participants in the HealthiER program. Our DID models adjusted for these differences in the populations.

The HealthiER model is associated with cost savings and reduced hospitalizations and ED visits, yet its lack of progress in linking enrollees with timely primary care, as estimated through claims data and despite qualitative evidence pointing to perceptions of improved access, highlights the influence of partner ECMC and affiliated clinics in impeding access through administrative challenges and lack of resources to serve this high-needs, targeted population. Its lack of progress also points to the difficulty that lay health workers may encounter when attempting to navigate a continuously changing local delivery system, with changes in the Medicaid health plan contracting as well as the churn as beneficiaries gain and lose Medicaid eligibility. A more narrowly specified scope of work for HealthiER CHWs, and a more tightly networked model, is being sustained and scaled across the regional health care system, under New ork Medicaid's DSRIP.

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University of Arkansas for Medical Sciences

Cost-Effective Delivery of Enhanced Home Caregiver Training. The Schmieding Center for Senior Health and Education augmented its existing home caregiver curriculum by re-structuring and designing coursework, developed on-line access to its coursework, implemented a micro-credit lending system to support trainees, and replicated the delivery of its coursework and loan in three geographically and demographically diverse states (California, Texas, and Hawaii).

PROGRAM MODELS: Home Health/Home Care, Workforce Training

LOCATION: AR, CA, HI, TX
GRANT: $3,615,818
AWARD DATES: 3/25/13 to 6/30/16
NO-COST EXTENSION: 12 month, loan closeout
PAYER(S): N/A

REACH: 3,447 trainees (164% of target)
POPULATIONS: Older Adults, Rural
DATA: NORC survey of trainees (2014-2015); one site visit (2014); telephone interviews with leadership (2014-2016)

- The microcredit loan option to finance the training was underutilized, and the default rate on the loan was higher than anticipated.
- Home care agencies have increased their efforts to recruit new-hires from training course graduates.

- Staff turnover at multiple sites, among managers and instructors, posed significant challenge to implementation

- Curriculum meets new Arkansas requirement for home care worker training.
- State-specific requirements for home caregiver training may limit suitable training sponsors and require adjustments to program content.
- Home caregiver wage and employment status post-training is linked to students' ability to re-pay micro-credit loan.

OUTCOMES§

Workforce trainee survey findings:

- **Satisfaction.** Trainees were more likely to report being very satisfied with training (91% vs. 78% for comparators), although twice as likely to report difficulty with scheduling training (12% vs. 6%).
- **Learning.** Trainees are more likely to report having learned stress-reduction techniques (94% vs. 80% for comparators), and skills specific to caring for patients with cognitive impairment (20% vs. 4%).
- **Feedback from Employer/Agency.** Employed trainees are more likely to report specific, positive feedback (73% vs. 67%), and receive problem-solving advice (77% vs. 73%).
- **Employment Experience.** Trainees report working more hours per week, on average (42 vs. 39 for comparators), and are more likely to express satisfaction with the number of hours worked (59% vs. 52%).
- **Wages and Income.** Trainees report earning higher wages (average of $9.37/hour vs. $8.96/hour for comparators), and are twice as likely to report satisfaction with their wages (30% vs. 15%).

Analysis limited due to lack of claims data.

SUSTAINABILITY, REPLICABILITY, & SCALING

UAMS continues to offer the courses developed with HCIA funding, both in-person and online. The NCE period was granted for the purpose of recapturing micro-credit loan funds for return to the federal government.

There are no plans to further replicate or scale this innovation.

§Outcomes are from a NORC workforce trainee survey that includes an external comparison group and are statistically significant at the p<0.05 level.

Overview of Cost-Effective Delivery of Enhanced Home Caregiver Training

Background. The Schmieding Center for Senior Health and Education was established in the early 1990s to provide training to personal care aides (PCAs) working in home care or home health, and the center has a national reputation as a leader in this area. Affiliated with the University of Arkansas for Medical Sciences (UAMS) College of Medicine, the center is based in Springdale, Arkansas. Prior to the HCIA award, UAMS offered a set of caregiver training courses (116 hours) focused on activities of daily living (ADLs), medical conditions, skills, documentation, and a dedicated course on Alzheimer's and dementia.

HCIA funding allowed the Schmieding Center to expand its offerings and test replication strategies through microcredit financing of coursework and partnerships with sites in California, Hawaii, and Texas (one site per state).

- **Curriculum.** The center redesigned courses to emphasize competencies useful in managing clients with multiple chronic conditions. This involved combining pre-existing courses; creating the new, advanced course "Family Care Advocate"; and developing online versions of courses.
- **Replication.** The center joined implementation partners in three locations: WISE and Healthy Aging (California); Kapi'olani Community College (Hawaii); and Central Texas Aging and Disability Resource Center (Texas). Each satellite and partner site uses the same curriculum, materials, and teaching method as the Springdale location. Each partner faced distinct challenges in implementing training: California state requirements did not align with the UAMS curriculum and there were competing PCA training programs; the site partner in Hawaii faced multiple obstacles to administering the microcredit loan; and training for home health aides in Texas was in greater demand than was training for PCAs.
- **Microcredit Loan.** The center offered small loans intended to make training more affordable and therefore more accessible.

Schmieding Center Courses

- In-Home Assistant (IHA; 40 hours, focus on fundamental caregiving skills). This course fulfills Arkansas state requirements for home caregivers
- Alzheimer's Disease and Dementia (16 hours, for experienced caregivers)
- Home Care Assistant (60 hours, requiring IHA as a prerequisite, focus on long-term services and supports)
- Family Care Advocate (40 hours, for experienced caregivers, focus on chronic disease management and communication).

Goals. The Schmieding Center's innovation does not address the four CMMI core metrics directly (e.g., having a measurable impact on total cost of care, hospitalizations, emergency department visits, or readmissions for Medicare and/or Medicaid beneficiaries), as the center does not identify or monitor the status of clients who hire trained PCAs. Rather, this awardee aims to develop the home health/home care workforce by increasing the supply of trained caregivers in Arkansas and at partner sites, elevating the quality of home care through enhanced access to high-quality training and improving the career prospects of caregivers.

Program Models and Practices. The awardee provides experiential and competency-based training for in-home PCAs. In addition, the awardee developed a microcredit loan system to engage low-income caregivers whom might be unable to afford tuition otherwise.

Implementation Updates. NORC's Second Annual Report (September 2016) included data on UAMS through March 31, 2015; the Schmieding Center continued to operate its training programs under HCIA for an additional 90 days (through June 30, 2015), and has used a no-cost extension period solely for collection activities related to the microcredit loans. Key developments since April 1, 2015, for the awardee include the following:

- **Curriculum.** UAMS has revised its certified nursing assistant (CNA) coursework and added financial counseling to the In-Home Assistant course.
- **Relationships with Implementation Partners.** Partnerships have been strengthened with Arkansas home care/home health agencies. Agencies have begun to send representatives to the In-Home Assistant courses, in order to recruit caregivers toward the start of their careers. While the awardee has noted that there appears to be little enforcement of Arkansas's April, 2014, state requirement that PCAs have at least 40 hours of training, the awardee observed an increase in enrollment immediately following passage of the legislation that has since plateaued, leveraging the value of HCIA-supported curricular revision.
- **Microcredit Loan.** Fewer students borrowed funds using the microcredit loan than had been anticipated. A total of 327 loans ($142,905) comprised 162 loans at the Arkansas sites (total of $56,905); 155 loans at the California site ($82,640); eight loans at the Texas site ($3,000); and two loans in Hawaii ($360). The awardee's initial plans had been to recycle loan funds, using repaid proceeds to issue loans to new students; however, a post-launch clarification by CMMI determined that all loans funds were to be repaid to the federal government at the conclusion of the grant, through the no-cost extension period. A higher-than-anticipated default rate has meant much follow-up work for the awardee. The UAMS leadership team did not recommend replication of the loan component, due to low uptake among students and difficulties with repayment, and advises financial support that does not require repayment (e.g., grant or scholarship).

Summative Findings (Outcomes)

Since UAMS does not identify or monitor the clients who hire Schmieding Center graduates, there are no Medicaid or Medicare claims data available with which to analyze the impact of UAMS's innovation on beneficiaries. Our analysis focuses instead on the effectiveness of the HCIA-funded training program at improving caregivers' knowledge, skills, and behaviors related to providing care to medically complex patients.

Workforce Development

Staffing

The HCIA principal investigator, who had been at the Schmieding Center in Springdale, is a board certified gerontologist. The HCIA award created several new administrative positions, including project director, outreach manager, administrative coordinator, instructional development specialist, and nurse educator. A director of education position already existed, but a newly hired director of education in 2010 was brought on to work mostly on the distance education piece of the HCIA award. The core group of administrative staff funded by the HCIA award is supported by non-HCIA funded staff (i.e.,

administrative and nurse educators) in each Schmieding Center satellite site in Arkansas, and replication sites in California, Hawaii, and Texas.

Training

We base our assessment of UAMS's HCIA-funded innovation on qualitative data (one site visit and a series of telephone interviews), and on findings from a telephone survey that NORC developed in collaboration with UAMS and fielded with UAMS-trained caregivers (n=727) and a comparison group of caregivers who had not received training or were trained by another entity (n=249). Comparators in the survey were recruited by Arkansas-based home health or home care agencies, or other regional agencies employing caregivers, in partnership with NORC. The survey was administered from August 2014 to June 2015, with an overall response rate of 66 percent.[254] Respondents were currently employed caregivers, unpaid family caregivers, or trainees who had completed some caregiver coursework but were not currently employed as a caregiver or caring for a family member. Findings have been presented in previous NORC reports to CMMI (2016) and are restated in summary form below.[255]

Trainee Background. Over half of trainees are between the ages of 30 and 65 (58 percent) and almost all are women (89 percent). Over two-thirds are white (70 percent) and nearly one-quarter are African American (24 percent). UAMS trainees and comparator survey respondents are similar in age distribution, gender, race and ethnic identification, and household size (over half live alone or with one other person). Members of both groups serve two or three clients per week, working approximately 21 to 24 hours per client. We found the following noteworthy differences between trainees and comparators:

- Higher educational attainment: Sixty-seven percent of trainees have at least some college education, compared with 58 percent of comparators.
- Less likely to be qualified as a Certified Nurse Assistant (CNA): Thirty percent of UAMS trainees are CNAs versus 38 percent of comparators.
- Higher household incomes: Forty-nine percent of UAMS trainees report incomes of at least $25,000, versus 39 percent of comparators. Differences in ages may explain the difference in household income between the two groups, as reviewed below.
- Less of a commitment to caregiving as a long-term career: Sixty-seven percent of trainees, versus 78 percent of comparators.
- Lower likelihood of currently working as a caregiver: Sixty-one percent for trainees, versus 82 percent for comparators. Thirty percent of trainees are less likely to work for a home health or home care agency (versus 69 percent of comparators), while trainees are more likely to work as an independent contractor (19 percent versus 2 percent of comparators).
- Fewer years of work experience with older adults (8 years for trainees versus 11 years for comparators), but more hours of training (88 hours for trainees versus 67 hours for comparators).

[254] 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.

These differences may have implications for our interpretations of findings related to training program effectiveness.

Previous Training Experience. Most UAMS trainees (68 percent) have not received training other than that provided by the Schmieding Center. Even when a UAMS trainee actually completed training outside of Schmieding, 45 percent received most of their caregiving training there. Eighty-five percent of comparators reported "other training organization" (neither Schmieding nor college) for most of their training. This is most likely their employer, given the recruitment of comparators through outreach to agencies around the state, with the largest two agencies offering their own caregiver training programs.

Trainee Relationship to Client and Client Needs. Among those currently employed as a caregiver, about one-quarter of UAMS trainees and comparators report being the primary caregiver for a household member (23 percent for trainees versus 24 percent for comparators); half of UAMS trainees and comparators report that this person is their main client. UAMS trainees are more likely to report that their main client has cognitive impairments, difficulty concentrating, remembering, or making decisions (66 percent versus 56 percent of comparators), and that dementia is the main reason that their client needs assistance (22 percent versus 13 percent for comparators). UAMS trainees are somewhat more likely to work for clients needing assistance with ADLs such as dressing or bathing (76 percent of UAMS versus 81 percent of comparators), but about equally likely to work for clients with serious difficulty walking or climbing stairs (80 percent for UAMS trainees versus 81 percent of comparators).

Unpaid family caregivers with UAMS training report working for significantly fewer patients with serious functional difficulties (walking or climbing stairs, dressing or bathing). Open-ended survey responses note a higher rate of mobility issues for clients of paid caregivers (26 percent versus 19 percent for unpaid family caregivers); dementia (22 percent versus 17 percent for unpaid family); and assistance with ADLs (26 percent versus 10 percent for unpaid family). This pattern may reflect under-reporting by unpaid family caregivers, who may be reluctant or unable to recognize serious functional difficulties, or who may be taking UAMS courses proactively, anticipating the future needs of family or friends.

We evaluate the impact of the Schmieding Center's innovation using the Kirkpatrick rubric for assessing training program effectiveness. The scope of our evaluation encompasses Kirkpatrick Levels 1 and 2, with limited attention to Level 3.

Reaction to Training. At least three-quarters of UAMS trainees (74 to 80 percent) have completed four of the six courses offered by the Schmieding Center (elder pal, personal care assistant, home care assistant, and Alzheimer's and dementia). Sixty- four percent completed the In-Home Assistant course, which may be used to satisfy state training requirements for home caregivers, and 37 percent completed the Family Care Advocate course, developed under the HCIA grant.[256]

The Schmieding Center training receives high marks. Among those currently working as a caregiver, almost all UAMS trainees report being very satisfied with their caregiver training (91 percent), compared with 78 percent of comparators trained elsewhere; overall, 99 percent of UAMS trainees and 97 percent of comparators report being somewhat or very satisfied with training. Both groups are nearly unanimous

[256] See Appendix F, Exhibit "UAMS Courses Completed" [F.UAMS.1, Q7]

(99 percent) in reporting that training materials are useful and most (90 percent of trainees versus 93 percent of comparators) say that instructors often allow adequate time for questions and discussions. Most (84 percent of trainees and 88 percent of comparators) report that courses are very easy or somewhat easy to fit into their own schedules, though trainees are twice as likely to report some difficulty with scheduling training (12 percent of trainees versus 6 percent of comparators); since respondents were recruited from agencies that provide training to their employees, this difference could reflect a potential advantage to internal agency training. UAMS trainees who describe themselves as unpaid family caregivers are less likely to report being very satisfied with their training (84 percent versus 91 percent for employed UAMS trainees), although nearly all say that they are very or somewhat satisfied with their UAMS training (99 percent). Those who have taken at least some training and are unemployed (as either paid or unpaid caregivers) are somewhat more likely than unpaid caregivers to report being very satisfied with their training (88 percent), and 97 percent say that they are very or somewhat satisfied.

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact on Organization. What benefits to the organization resulted from the training?

Learning From Training and Behavior Change. Among those currently working as caregivers, over 90 percent of both trainees and comparators report having learned most skills listed in a survey item; however, UAMS trainees are more likely to report having learned stress reduction techniques (94 percent versus 80 percent of comparators). When queried about the most useful part of training, both UAMS trainees and comparators praise hands-on or experiential training (17 percent of trainees versus 20 percent of comparators). In addition, UAMS trainees are more likely to cite training specific to cognitive impairments such as Alzheimer's (20 percent of trainees versus 4 percent of comparators), which may reflect the Schmieding Center's specific course on Alzheimer's and dementia.

List of Skills Queried by Survey
- Learned skills to communicate with client's health care team
- Learned documentation skills helpful to health care team
- Learned to monitor changes in client's health
- Learned how to talk with clients about their health goals
- Learned how to provide care the way clients prefer
- Learned techniques for reducing caregiver stress
- Feel prepared to perform job of home caregiver
- Talked with clients about how to set up their homes so they can move around safely

Unpaid family caregivers also enroll in UAMS courses. Their experiences are not identical to those of paid caregivers. Unpaid UAMS trainees are statistically less likely to report learning skills related to documentation (90 percent versus 98 percent for employed trainees) or monitoring changes in a client's health (91 percent versus 98 percent for employed); feeling prepared to perform as a home caregiver (93 percent versus 99 percent); and talking with clients about home safety (78 percent versus 93 percent of employed trainees). Unemployed trainees who have received training, but who are not currently employed, and family caregivers, both reported learning skills at the same or higher percentage as did unpaid family caregivers.

Trainee experience with the Family Care Advocate (FCA) course can tell us about the impact of HCIA funding directly, since the course was developed with HCIA funds and is an advanced-level offering.

Among UAMS trainees currently employed as a caregiver, those who completed the FCA course (n=183) report learning skills at or above the percentage of those who did not complete the FCA course (n=262); in particular, FCA completers are significantly more likely to report learning how to talk with clients about goals, learning techniques for stress reduction, and to have spoken with clients about home safety. Finally, more FCA trainee respondents learned techniques to reduce their own stress than their non-FCA counterparts.

Implications for Workforce

Microcredit Loan. UAMS allocated part of its HCIA funding for microcredit loans to students, to make training more affordable; a small percentage of survey respondent trainees (6 percent) borrowed using this loan vehicle, while 43 percent of trainee respondents financed the training themselves; 41 percent tapped scholarships, grants, family members, or other sources; and 10 percent had an employer or agency pay for training. Among those who did not use a microcredit loan, 42 percent noted that it was not needed, 31 percent reported that the loan either was not offered or that they were unaware of it, and 11 percent did not wish to become indebted. In addition, a small group of respondents reported altruistic reasons for declining the offer of a loan, out of concern that others might have greater need for the loan. The experience of UAMS trainees is in contrast to that of comparators, for whom employers or agencies often paid for training (57 percent of comparators versus 10 percent for UAMS trainees).

Feedback from Employer/Agency. The extent to which agencies provide constructive feedback to trainees who are employed may facilitate or inhibit a caregiver's ability to use newly learned skills and thus mediate the impact of training. Employed caregivers in the treatment and comparison groups report receiving constructive criticism and helpful hints to about the same extent, with most reporting that they receive this type of feedback. UAMS trainees are somewhat more likely to receive specific, positive feedback (73 percent versus 67 percent for comparators) and to receive problem-solving advice (77 percent versus 73 percent for comparators). UAMS trainees who completed the FCA course are even more likely to report constructive feedback, compared with UAMS trainees who did not complete the course (78 percent for completers versus 69 percent for non-completers), and being given specific comments about things that could be improved (68 percent for completers versus 59 percent for non-completers).

Employment Experience. A subset of UAMS trainees surveyed (n=167 respondents) completed training, but are not currently employed either as a paid or unpaid family caregiver; roughly equal percentages note that they are still a student or a recent graduate (20 percent), unable to find employment (18 percent), or have health or other family obligations that prevent work as a caregiver (18 percent).

Overall, about two-thirds of both UAMS trainees (67 percent) and comparators (69 percent) report being very satisfied with their agency, and about one-quarter are somewhat satisfied (24 percent for UAMS trainees versus 23 percent for comparators. Both give similarly high ranking to satisfaction with client relationships (93 percent).[257] UAMS trainees who are currently employed at an agency are about as likely as comparators to have worked for more than one home care or home health agency at a time, an indicator

[257] Interviewers prompted respondents working for more than one agency to answer the questions for the agency for which they work the most.

that one agency may not be supplying the number of hours or income level needed by direct care workers. Managing schedules for multiple employers may be logistically and emotionally stressful. Furthermore, agencies may have differing expectations for caregiving approaches and protocols, and they may vary in the type and amount of support and mentoring provided to staff. This may create challenges for caregivers as they try to put new skills and ideas learned in training into practice. UAMS trainees and comparators also differ significantly in their satisfaction with the number of hours worked (59 percent for UAMS trainees versus 52 percent for comparators). This finding may be influenced by the difference between these two groups in the average number of hours worked each week—about 42 hours for a UAMS trainee and about 39 hours for a comparator.

Wages and Income. One important difference between UAMS trainees and comparators who are employed at an agency, or at both an agency and as an independent contractor, concerns earnings: UAMS-trained caregivers earn $9.37 an hour, while caregivers from the comparison group earn $8.96 an hour, a statistically significant difference. When controlling for educational background, work type, and caregiver training (other than Schmieding Center training), a statistically significant difference in wage remains except for those who are only employed at an agency and not as an independent contractor, and those who received most of their training (other than Schmieding Center training) at a four-year college or community college. Other factors–such as caregiving experience, geographic location of employer, and amount of caregiving training received—may influence this difference between groups. Perhaps not surprisingly, UAMS trainees are significantly more likely to be very satisfied with their wages (30 percent versus 15 percent for comparators).

Context: Enhanced Home Caregiver Training in its Third Year

Factors external to UAMS and internal to the Schmieding Center delayed launch of the HCIA-funded innovation and presented multiple challenges to full implementation. The UAMS leadership team identified the three-year performance period as too short a time in which to successfully pilot and evaluate the program.

External Factors. As noted in NORC's Second Annual Report, 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 initially. However, the state has not created a monitoring and enforcement structure for this legal mandate, and enrollment has subsequently tapered.

Differences in state policies and market environments also have implications for implementation, reflected in the more limited take-up of UAMS training at the California, Hawaii, and Texas sites. Strongest enrollment would be expected within Arkansas, where the Schmieding Center is well-known. The state's new certification requirement likely created a demand for PCA training that did not exist in states without a similar training mandate. In contrast, partner sites often had difficulty acquiring state-level approval of the UAMS curriculum. Finally, in other states (e.g., Texas), the job market may have been geared towards a different job classification, such as home health aide, which requires qualification as a CNA, rather than PCA training.

Internal Factors. All sites have had to address staff turnover, among managers as well as instructors. At the Arkansas site, both the project director and the curriculum design specialist left the project, as well as nurse educators paid by non-HCIA funds. The awardee was able to hire a new director, and to replace the original principal investigator who left during the no-cost extension period, as well as leverage non-project funds to continue to revise course content and adapt courses for on-line delivery. At least one partner site (Hawaii) also reported significant staff turnover.

Changes in CMMI's agreement with the awardee regarding the terms of the microcredit loan component presented a significant challenge to successful implementation. NORC understands from the project leadership that the awardee's operating plans were altered as of April 2015, at CMMI's request, to require that loan funds be returned to the federal government, rather than used to create a revolving funds account at each site. Cooperative agreements with each site were subsequently modified to shift tasks from loan administration as part of sustainability to a focus on collections. While the awardee identifies an ongoing need to make training more affordable to prospective students, leadership concluded that the microcredit loan option is not workable as originally envisioned.

Sustaining Enhanced Home Caregiver Training

The Schmieding Center has continued to offer home caregiver training since the end of the HCIA performance period, using curricula developed with HCIA funds and delivered via web-based and in-person classes at sites within Arkansas. It has modified courses to enable completion of portions of coursework that allow continuing education credits (e.g., a 2-hour training). The no-cost extension period has been used to collect microcredit loan funds from students, for reimbursement of the federal government rather than the revolving fund initially envisioned; the awardee has otherwise discontinued the microcredit loan component of the intervention. There are no plans to further replicate or scale the Schmieding Center's HCIA-supported coursework.

Summary

Over the three-year implementation period, UAMS collaborated with home care and home health agencies in Arkansas and with partners in California, Hawaii, and Texas to successfully deliver training to 3,447 PCAs, well over the awardee's goal of 2,100. Compared with the experiences of PCAs trained elsewhere in Arkansas, UAMS trainees were more likely to be very satisfied with their training, to have learned skills especially useful when working with medically complex clients, to report receiving more effective performance feedback from employers/agencies, to express greater workplace satisfaction with the number of hours worked each week, and to earn higher wages ($9.37 hourly versus $8.96 hourly for comparators). These differences in outcomes may reflect in part the different employment profiles of UAMS trainees and comparators, as trainees are more likely to work as independent contractors.

The awardee and its partners have addressed significant implementation challenges related to staff turnover among project teams and to differing political, regulatory, and market environments among the four states where the training was delivered. The use of microcredit loans to make training more affordable for prospective students met with mixed success.

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University of Iowa

Transitional Care Teams. A partnership between University of Iowa Hospitals and Clinics (U Iowa) and ten rural critical access hospitals (CAHs) serving nine counties forms the U Iowa Critical Access Hospital Network. The program deploys four nurse-led transitional care teams (TCTs) that facilitate the shift of care from U Iowa to patients' homes, local CAHs, or skilled nursing facilities, with the goal of reducing post-discharge emergency department visits and hospital readmissions. Each TCT consists of a nurse, social worker, pharmacist, and physician located at U Iowa, together with a rural care coordinator based at each CAH.

PROGRAM MODELS: Behavioral Health/Substance Abuse, Care/Case Coordination, Home Health/Home Care, Pharmaceutical Care, Transitional Care

LOCATION: Iowa

GRANT: $7,662,278

AWARD DATES: 2/18/13 to 6/30/15

NO-COST EXTENSION: No

PAYER(S): All Payer

REACH: 2,032 beneficiaries (77% of target)

POPULATIONS: Adults, Behavioral Health/Substance Abuse, Rural

DATA: Medicare claims (7/11-12/15), Awardee Survey of participants and caregivers (1/15-6/15), one site visit (6/14), telephone interviews with leadership (2014 to 2016)

IMPLEMENTATION

- Medication reconciliation, one-page summary and home visits take place within 72 hours of discharge. During 2015, U Iowa adjusted its contracts with CAHs in order to provide greater financial support to those experiencing higher volumes of patients, given substantial variation across sites in the volume of patients needing care.

WORKFORCE

- Multidisciplinary teams led by nurses, and staffed with social workers, pharmacists and physicians.
- Three-day in-person interdisciplinary training as well as monthly distance learning courses reinforced through regular huddles.

CONTEXT

- Challenges conducting "virtual" telehandoffs due to WiFi connectivity and scheduling issues.
- Challenges delivering psychiatric service to patients due to professional shortages and lack of reimbursement.

OUTCOMES§

COST

- Reduction in total quarterly cost of care (-$5,533 per beneficiary-episode)

UTILIZATION

- No findings reach statistical significance.

QUALITY

- Increase in 30-day practitioner follow-up visits per quarter post-discharge (85 per 1,000 beneficiary-episodes)
- 93% of respondents report receiving a follow-up call from U Iowa staff within three days of discharge (timely services delivery)
- 91% report attending the scheduled follow-up appointment with their primary care provider after hospital discharge (timely services delivery)
- Among those who received a follow-up call, 72% report that the U Iowa staff member was very or extremely helpful (patient satisfaction)

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

The awardee reports that five out of the ten partner CAHs plan to continue their involvement, with rural care coordinators at these sites continuing to conduct post-discharge home visits and closely coordinate care with U Iowa. As of May 2015, project leaders were determining 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.

REPLICABILITY & SCALING

There are no current plans to scale the intervention.

§Outcomes for cost, utilization, and quality are from analyses that include a comparison group and are statistically significant at the p<0.10 level. Quality of care findings are also presented from NORC's analysis of data from the awardee's consumer survey.

Overview of the Transitional Care Teams Program

Background. The University of Iowa Hospitals and Clinics (U Iowa) intervention involves a partnership with 10 rural critical access hospitals (CAHs) in nine counties to reduce post-discharge emergency department (ED) visits and hospital readmissions for adult patients. U Iowa deploys nurse-led transitional care teams (TCTs) that facilitate the shift of care from U Iowa to patients' homes, local CAHs, or skilled nursing facilities. The four TCTs comprise a nurse, social worker, pharmacist, and physician located at U Iowa, as well as a rural care coordinator located at each of the CAHs, which together form the UI Critical Access Hospital Network.

U Iowa's intervention builds on prior work with the Iowa City Veterans Affairs Medical Center, which involved telehealth for the management of patients in intensive care units; home monitoring; nurse-led care coordination for rural patients with heart failure, chronic obstructive pulmonary disease (COPD), and diabetes; and the development of web-based personal health records. Located in the east-central part of the state, the awardee operates a 705-bed academic medical center that is one of the largest hospitals in the state. Patients with complex health conditions are referred to U Iowa from rural communities with limited resources for handling challenging cases. Project leadership describe the Medicare readmissions penalty as a strong motivating factor to better coordinate transitions of care for patients from rural areas. A U Iowa staff member used to be the chief executive officer (CEO) of a CAH and retains strong ties to the CAHs; this relationship proved instrumental in bringing CAHs to the table. CAHs are well connected within their small communities and deeply invested in their communities' health.

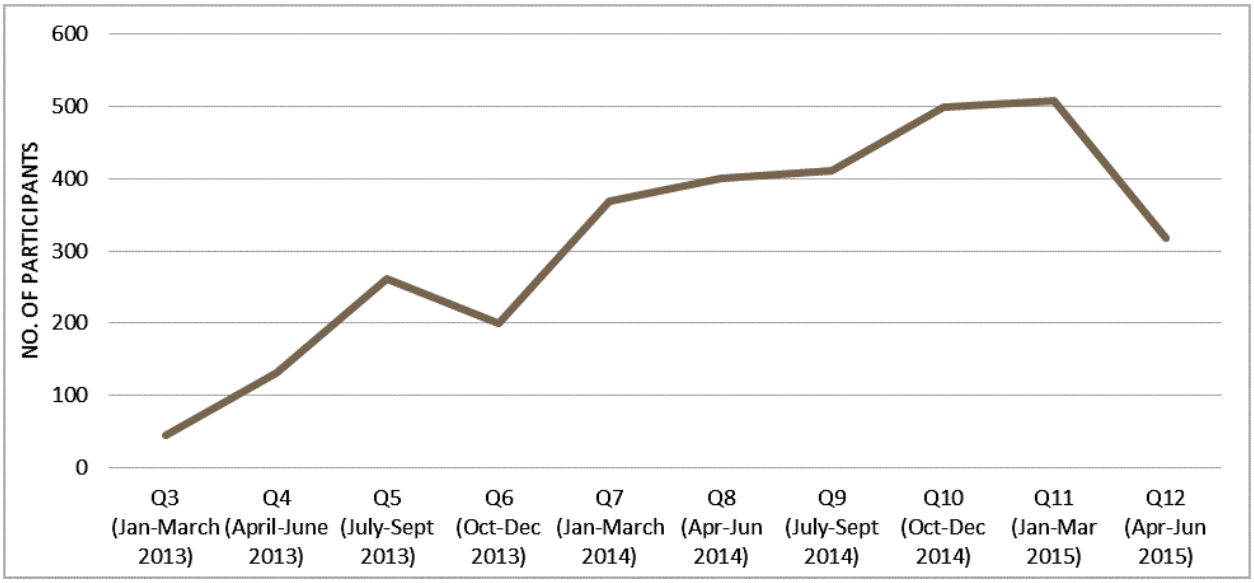
Goals. In addition to addressing the CMMI core measures, the TCT intervention focuses on improving patient experience of care.

Program Models and Practices. As described in the NORC First Annual Report, the U Iowa program emphasizes the connection between the care team, the hospitalized patient, and the rural care coordinator located at each of the rural CAHs. The intervention consists of care transition from U Iowa to participants' homes, including visits from rural care coordinators within 72 hours of discharge, and the relationships the rural care coordinators develops with intervention participants. Post-launch, the awardee attempted to use videoconference technology for a tele-handoff, introducing the patient at U Iowa to the rural care coordinator, in order to familiarize the patient with the rural care coordinator. This connection via videoconference was intended to increase the percentage of patients who accepted a home visit with the rural care coordinator. U Iowa faced challenges with Internet connectivity in all parts of the hospital and with scheduling telehandoffs at times when the patient, nurse, and care coordinator were all available.

Implementation Updates. As the awardee did not receive a no-cost extension, almost all data related to the TCTs were analyzed and presented in earlier NORC reports to CMMI; please see NORC's Second Annual Report (2016) for more information about implementation experience. Since that time, U Iowa has reported that it will establish regular, ongoing distance learning opportunities on a variety of topics pertaining to care coordination, to aid other hospitals and organizations in training a workforce focused on coordinating patient care. In addition, the awardee is examining ways to incorporate telehandoffs more formally into pre-discharge planning.

Reach and Demographic Profile of Enrolled Beneficiaries. As of June 30, 2015, U Iowa had served a cumulative total of 2,032 unique direct participants since program launch. Enrollment in U Iowa rose steadily through 2013 and remained steady through 2014 and 2015 until the last month of enrollment in June 2015 (see Exhibit UIHC.1).[258] During the most recent and final quarter for which data are available (April 1 through June 30, 2015), the program served 318 unique participants. About half of the participants are between 26 and 64 years old (51 percent), and one-quarter are older than 75 years (25 percent). Fifty-four percent are female. Most participants are identified as White (97 percent).

Exhibit UIHC.1: Total Number of U Iowa Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

U Iowa significantly reduces 90-day total cost of care and is associated with a significant increase in 30-day practitioner follow- up visits after hospital discharge.

In the section below, we present our analysis of program effectiveness, based on three types of data: Medicare Fee-For-Service (FFS) claims, surveys, and narrative from NORC interviews and site visit.

Core and Supplemental Measures

Our hospital analysis compares the experiences of U Iowa enrollees with those of a comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's TCT program over the implementation period as a whole and in each quarter of implementation. Our analysis is for Medicare FFS beneficiaries.

[258] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent UIHC self-reported data available for NORC's AR3 is for HCIA reporting quarter QR12, for the time period April 1-June 30, 2015.

Finder File and Creation of Analytic Sample. U Iowa provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[259] We identified 2,260 unique beneficiary-episodes from the finder file and further limited this number by enrollment date, Medicare identifiers, admission date, discharge date, and whether the episode was an inpatient claim, to yield an analytic sample of 924 beneficiary-episodes.[260]

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day Total Cost of Care per beneficiary-episode
- 90-day Hospitalizations
- 90-day ED visits
- 30-day Readmissions
- 7-day Practitioner Follow-up Visits
- 30-day Practitioner Follow-up Visits

Comparison Group. U Iowa's finder file also identified an internal comparison group of Medicare FFS patients discharged from U Iowa to TCT program counties in the pre-intervention period. Additionally, the finder file identified an external comparison group of Medicare FFS patients who had a qualifying discharge from the U Iowa hospital and resided in counties where their respective CAH did not participate in the TCT program. The external comparison group spans the pre- and post-intervention periods.

We use propensity score weighting (standardized mortality ratio weights) to minimize these observed differences in beneficiary-episode characteristics between the treatment and comparison populations. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting greatly improves comparability.[261]

Descriptive Characteristics. Exhibit UIHC.2 displays the descriptive statistics of beneficiary-episodes (discharges) for the intervention and comparison groups for three time periods: before implementation (six quarters); during ramp-up (two quarters); and after implementation. We compare the two groups with respect to demographics, comorbidities, and prior utilization.[262] Descriptive statistics are based on findings prior to propensity score weighting. Beneficiary-episodes attributable to the U Iowa program are more likely to be older; to qualify for Medicare on account of age (and less on the basis of disability); and to have a higher frequency of prior-year ED visits.

[259] Medicare claims are available for the time period from July 1, 2011, through March 31, 2016, for the analysis in this report. We include discharges before June 30, 2015, allowing for 90 day episodes through September 30, 2015. And claims run off through December 31, 2015.

[260] These episodes span the pre-implementation, ramp-up, and post-implementation period, with 380 beneficiary-episodes attributed to the treatment group and 544 beneficiary-episodes to the comparison group during the post-intervention period.

[261] The final propensity score model includes age, race, gender, dual eligibility, days of prior-year Medicare FFS coverage, hierarchical condition categories (HCC) score, prior-year hospitalization, and total prior-year cost of care. It also includes an indicator for patients' basis of eligibility for Medicare, i.e., age, disability, end-stage renal disease (ESRD), or both disability and ESRD. For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

[262] We tested differences between the groups with 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 disposition, and disease composition).

Exhibit UIHC.2: Descriptive Characteristics for Transitional Care Teams and Comparison Group Beneficiary-Episodes

	Pre-Intervention		Ramp-Up Period		Post-Intervention	
	Iowa	Comparison	Iowa	Comparison	Iowa	Comparison
Number of Beneficiary-episodes	**456**	**411**	**39**	**103**	**380**	**544**
Age Group % (N) * **						
65-69 years	23.2 (106)	29.0 (119)	25.6 (10)	27.2 (28)	20.0 (76)	29.0 (158)
70-74 years	13.4 (61)	16.8 (69)	25.6 (10)	16.5 (17)	12.6 (48)	17.3 (94)
75-79 years	16.2 (74)	13.6 (56)	10.3 (4)	16.5 (17)	17.6 (67)	15.1 (82)
80-84 years	14.3 (65)	14.8 (61)	10.3 (4)	12.6 (13)	15.0 (57)	12.1 (66)
≥85 years	13.4 (61)	10.0 (41)	15.4 (6)	9.7 (10)	14.2 (54)	12.3 (67)
Race/Ethnicity % (N)						
White	97.8 (446)	98.5 (405)	94.9 (37)	99.0 (102)	98.7 (375)	97.8 (532)
Hispanic	0.4 (2)	1.0 (4)	0.0 (0)	0.0 (0)	0.5 (2)	0.7 (4)
Gender % (N)						
Female	52.6 (240)	45.7 (188)	41.0 (16)	44.7 (46)	54.2 (206)	50.4 (274)
Hierarchical Chronic Conditions (HCC)						
Mean Count of HCCs (Standard Deviation) **	4.3 (2.8)	4.7 (2.9)	4.5 (2.7)	4.6 (2.8)	4.2 (2.6)	4.6 (2.8)
Mean HCC Score (SD) ***	2.8 (1.7)	2.9 (1.7)	2.7 (1.6)	2.7 (1.6)	2.6 (1.5)	2.9 (1.7)
Coverage Reason % (N) **						
Age	67.1 (306)	57.4 (236)	61.5 (24)	59.2 (61)	67.9 (258)	58.1 (316)
Disability	31.4 (143)	39.7 (163)	35.9 (14)	35.9 (37)	28.7 (109)	39.0 (212)
ESRD	0.7 (3)	1.7 (7)	0.0 (0)	1.9 (2)	1.3 (5)	1.5 (8)
Disability and ESRD	0.9 (4)	1.2 (5)	2.6 (1)	2.9 (3)	2.1 (8)	1.5 (8)
Discharges * **						
Home	44.1 (201)	48.9 (201)	56.4 (22)	58.3 (60)	48.7 (185)	50.4 (274)
Skilled Nursing Facility	18.0 (82)	17.3 (71)	2.6 (1)	17.5 (18)	15.8 (60)	20.6 (112)
Home Health Agency	5.9 (27)	7.8 (32)	20.5 (8)	6.8 (7)	5.5 (21)	7.5 (41)
Hospice	4.4 (20)	4.1 (17)	0.0 (0)	1.9 (2)	2.9 (11)	3.9 (21)
Other	27.6 (126)	21.9 (90)	20.5 (8)	15.5 (16)	27.1 (103)	17.6 (96)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiary-episodes unless noted)						
Total Medicare Cost (SD) per beneficiary-episode ($)	$26,162 ($46,291)	$27,771 ($40,745)	$24,067 ($30,259)	$22,280 ($28,080)	$24,262 ($36,482)	$27,214 ($41,625)
Hospitalizations (SD)	1,143 (3,161)	1,201 (2,067)	1,459 (2,695)	932 (1,173)	917 (1,847)	1,033 (1,630)
ED Visits (SD) **	2,279 (3,715)	2,579 (4,073)	3,284 (4,946)	2,224 (3,315)	2,959 (8,090)	2,320 (3,191)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of TCT Program. Exhibit UIHC.3 presents the average quarterly and aggregate impact of the U Iowa program on its participants relative to the comparison group.[263] Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter). We find the following relative to the comparison group:

- **Cost:** A significant decrease in 90-day total quarterly cost of care (-$5,533 per beneficiary-episode).

[263] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

- **Utilization Measures:** Increases in hospitalizations, ED visits, and readmissions, but none of these changes reaches statistical significance.
- **Quality of Care Measures:** Increase in practitioner follow-up visits within 30 days of the qualifying hospital admission (85 per 1,000 beneficiary-episodes per quarter), with a non-significant increase in seven-day follow-up visits.

Exhibit UIHC.3: Impact of Transitional Care Teams on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate [90% Confidence Interval]**
90-day Total Cost of Care per beneficiary-episode ($)	**-$5,533 [-$10,968; -$98]** *
90-day Hospitalizations	54 [-20, 128]
90-day ED Visits	22 [-51, 95]
30-day Readmissions	46 [-20, 112]
7-day Practitioner Follow-up Visits	6 [-71, 83]
30-day Practitioner Follow-up Visits	**85 [16, 154]** **
AGGREGATE IMPACT[§§]	
Outcome Measures	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$2,102,365 [-$4,167,639; -$37,091]** *
90-day Hospitalizations	20 [-8, 48]
90-day ED Visits	8 [-20, 36]
30-day Readmissions	17 [-8, 42]
7-day Practitioner Follow-up Visits	2 [-27, 31]
30-day Practitioner Follow-up Visits	**32 [6, 58]** **

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bolded** fonts indicate where findings reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of beneficiary-episodes (380) and total length of program implementation (8 quarters).

Impact of TCT Program in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Quality of Care (Survey and Qualitative Findings)

NORC's evaluation uses survey data collected by U Iowa in the first half of 2015 to assess the impact of the TCT intervention on quality of care, measured in terms of communication with the TCT staff, patient coordination with primary care providers, and overall experience of care.[264] U Iowa's survey consisted of

[264] U Iowa fielded and collected the survey data, and transferred these de-identified data to NORC for analysis.

approximately 10 questions, and a total of 118 TCT patients participated in the phone survey (response rate of 53 percent).[265]

Timeliness of Services Delivery. The TCT (hospital-based) coordinator contacted about nine out of ten participants on the phone in under three days. Contact within this time period is important to address any patient or caregiver concerns, confusion about discharge instructions or medications, and to assess whether the patient is recovering as expected or experiencing worsening symptoms. The rural care coordinator contacted slightly fewer participants. About three-fourths of those contacted by the TCT or rural (local) coordinator found the coordinator to be highly helpful. About 91 percent of participants were able to schedule their follow-up appointments with their PCP after being discharged; of these participants, nine out of ten thought their PCP was informed about their recent hospital stay. Nine participants who were unable to schedule their appointments indicated that the delays were due to insurance, appointment cancellations, or not knowing they needed a follow-up.

Beneficiary Experience and Satisfaction. About three-quarters of participants rated their experience with the TCT program as very positive—a 9 or 10 on a scale of 1 to 10. Ninety percent rated their experience an 8 or higher. All of the 11 respondents who rated their experience with the TCT program lower than an 8 had been contacted by a TCT coordinator in less than three days, while about 67 percent were contacted by a local coordinator, and 60 percent indicated that their local doctor was informed about their hospital stay.

Exhibit UIHC.4: U Iowa Consumer Experience Survey Items

Variable	Respondents % (N)
Contacted by TCT coordinator <3 days	92.9 (98)
Among persons contacted, TCT very or extremely helpful	71.9 (89)
Contacted by local coordinator	86.3 (102)
Among persons contacted, local coordinator very or extremely helpful	73.6 (87)
Able to attend scheduled follow-up visit with primary care provider after discharge	91.0 (111)
PCP informed of hospital stay	89.1 (101)
Connected TCT team via Skype	0.0 (101)
Overall experience 8+	88.7 (97)
Overall experience 9+	72.2 (97)

NOTE: Except for questions on helpfulness of the coordinator, n refers to the number of respondents who replied to the question from the 118 completed calls.

[265] Patients were eligible for the survey if they agreed to participate in the TCT intervention and had been discharged from U Iowa between four and six weeks earlier. Patients were not eligible for the survey if they had previously been surveyed, were currently hospitalized, or had special protections on their medical records. In addition, patients were excluded if they were not going to be followed by a local coordinator due to death, discharge to long-term care or hospice, discharge out of county, or because the patient no longer wished to participate. Source: Dukes et al., Short Report on the Transitional Care Program Patient Survey, University of Iowa Hospitals and Clinics. See Appendix F, Exhibit "U Iowa Consumer Experience Survey Items" for complete set of findings. 2015.

Workforce Development

Staffing. The TCT program relies on a nurse coordinator and also consists of a physician, social worker, clinical pharmacist, and a rural care coordinator at the CAH. Most staff were already employed at U Iowa or the 10 CAHs and there has been very little project staff turnover. During the June 2014 site visit, staff reported that the rural care coordinator for the Washington County CAH was the only staff member to have left the project; the staff appear to be deeply committed to their patients and to the communities that they serve.

> "We didn't have a clue what [social supports] were available for our patients when I started…I didn't know anything about motivational interviewing before training with Iowa."
>
> –Rural Care Coordinator

Training. U Iowa conducted a three-day in-person interdisciplinary training as well as monthly distance learning courses for its intervention staff. All team members complete courses designed to help them develop knowledge and skills for delivering post-discharge care and care coordination. Courses include *Transitions of Care Orientation, Care Coordination Workforce Development Program, Motivational Interviewing*, and shorter units on medical conditions (congestive heart failure, diabetes, mental health services, and health and wellness) and techniques (motivational interviewing). Training is also reinforced through regular huddles that focus on a particular subject, as well as monthly videoconferences for reviewing best practices, training materials, and case studies. An annual session serves as a refresher for all employees involved in the intervention.

Implications for Workforce. Awardee survey data show that training was well received. The average overall score for the 46 individuals who completed the training was 4.65 out of 5. Trainees reported feeling much more knowledgeable about all of the training components. In a follow-up survey six months after the training, trainees reported that care management adherence had improved; learning about care coordination had improved their effectiveness; they were more knowledgeable about assisting patients and families; and they had the skills to engage in care coordination. During the site visit, a rural care coordinator also reported using motivational interviewing tactics from the training to engage patients in self-management.

> "You need a [staff member that can liaison with the Critical Access Hospitals (CAHs], because she brings with her a very respected reputation. Things are changing and CAHs know this…they know that they need to be a part of something bigger…Success of these programs [is] based on the caliber of people you can recruit and the relationships you can build."
>
> –Program Leadership

Context: Transitional Care Teams in its Third Year

The TCT intervention benefits from strong support from the 10 partner CAHs and public health leaders in these rural areas. Discussions with U Iowa program staff and CAH CEOs reveal how invested they are in improving the health and health care experiences of patients in rural Iowa. CAH CEOs see collaborating with U Iowa as an important part of increasing care coordination, transitions of care, and social service support for their patients who are discharged to their rural communities, where supports and adequate follow-up care are often lacking, making it more difficult for beneficiaries to remain stable and healthy at home. U Iowa also holds monthly calls with the CAH CEOs to discuss the intervention and any questions they may have. The meetings are important for addressing CAH CEO concerns and recommendations.

Sustaining, Replicating, and Scaling the TCT Intervention

As stated in NORC's Second Annual Report (2016), U Iowa readjusted its contracts with the CAHs in order to provide greater financial support to those experiencing higher volumes of patients, since the volume of patients needing care from rural care coordinators varied substantially across counties. The awardee reports 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. As of May 2015, project leadership reported that they were still determining which staff based at the U Iowa hospital would continue to be involved in the intervention, with nurses and pharmacists likely to maintain their roles in the program. The CAHs and UIHC will use their own assets to support the intervention program components.

Summary

Our claims-based findings for U Iowa suggest that, relative to a comparison group, the TCT program is associated with significant cost savings and improved quality of care, measured by a greater number of 30-day practitioner follow-up visits post-discharge. Awardee survey findings note timely service delivery and overall beneficiary satisfaction with the intervention.

The following limitations of our quantitative findings should be noted. First, our findings are limited to participants with a qualifying inpatient admission, which comprise 85.5 percent of the awardee-provided patient file. Second, the intervention selects participants from among patients discharged from the U Iowa hospital with a broad range of chronic health conditions, behavioral health conditions, and other diagnoses. It is possible that the intervention was more effective for certain subgroups, but with 380 participants in the treatment group, analyses stratified by condition or diagnosis would likely lack statistical power. Although the comparison group of patients was matched using criteria including acuity scores and prior-year utilization, it is possible that the mix of conditions differed between the treatment and comparison groups. Third, while the TCT program was conducted in partnership with 10 rural CAHs, the comparison group was drawn from counties with non-participating CAHs; characteristics of the two groups of hospitals (e.g., number of beds) were not available for this evaluation, so we are unable to account for possible differences between the hospitals that could impact patient care and our measures.

U Iowa's survey findings indicate that participants are being contacted by intervention staff after hospital discharge, following up with their PCPs, and that beneficiaries are very satisfied with their overall experience of the program. As mentioned, following up with patients after hospital discharge is a key aspect of the TCT intervention, and patients report that they are being contacted after returning home and that UIHC staff are helping them schedule follow-up appointments with their primary care provider. Most patients also report that the rural care coordinators are helpful.

References

HCIA Narrative Progress Report for University of Iowa, for Reporting Quarter End Date 6/30/2015. University of Iowa, submitted 7/31/2015.

HCIA Quarterly Report for University of Iowa, for Reporting Quarter End Date 6/30/2015. University of Iowa, submitted 8/31/2015.

University of New Mexico

Extension for Community Healthcare Outcomes (ECHO Care). This program expands on the Project ECHO model to deliver weekly virtual grand rounds, linking a team of specialists at the University of New Mexico with multidisciplinary outpatient intensivist teams (OITs) at six sites around the state. The teams deliver clinic and home-based care to high-risk adult Medicaid beneficiaries.

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Care/Case Coordination, Clinician Decision Supports, Collaborative Medical Home, Home Health/Home Care

LOCATION: New Mexico

GRANT: $8,473,809

AWARD DATES: 9/01/13 to 6/30/16

NO-COST EXTENSION: 12 month, full program

PAYER(S): Medicaid

REACH: 746 beneficiaries (100% of target)

POPULATIONS: Adults, Behavioral Health/Substance Abuse, Rural

DATA: Medicaid claims (9/13-6/15); Awardee Patient and Workforce Surveys (rolling basis); one site visit (10/14)

IMPLEMENTATION

- Recruitment shifted from claims algorithm to direct recruitment and outreach through a paid recruiter who targeted emergency department (ED) discharge planners to identify Medicaid health plans.

WORKFORCE

- ECHO Care provided multiple levels of training for OITs and weekly and monthly learning and monitoring of care to patients.
- Inter-professional teamwork was prioritized within OITs, integrating CHWs into the clinical team.

CONTEXT

- The program experienced difficulties in recruiting and changes in targeting over the three-year period.
- There was a major delay in launching program due to change in Medicaid managed care relationship, including negotiating care management and fee structure.

OUTCOMES§

COST

- Decrease in total cost of care (-$2,044 per beneficiary per quarter)

UTILIZATION

- Decreases in hospitalizations and ED visits that reach statistical significance after five quarters of enrollment (second year)

QUALITY

- Decrease in potentially avoidable hospitalizations that reaches statistical significance after six quarters of enrollment (second year)

Analysis limited due to small number of claims quarters.

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

U New Mexico's ECHO Care model of web-supported telementoring will continue to offer access to weekly specialty rounds and medical education for rural providers who are members of each site's OIT.

REPLICABILITY & SCALING

Awardee may collaborate with New Mexico's Medicaid managed care health plans to expand eligibility criteria for the model.

§Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and, if a numeric value is given or noted, statistically significant at the P<0.10 level. This front page summary of the U New Mexico awardee chapter includes findings based on NORC's original analyses. The awardee chapter includes quality of care and health outcomes documented by the awardee's internal surveys, representing the awardee's original work; however, only findings developed by NORC are included in this front page summary.

Overview of ECHO Care

Background. The awardee team piloting ECHO Care is based at the University of New Mexico Medical Center at Albuquerque. It is part of ECHO Institute, a well-established center that has been developing, fielding, replicating, and scaling versions of Project ECHO, with multiple streams of public and philanthropic funding, both domestic and global. The HCIA-funded demonstration is a modification of Project ECHO, an evidence-based model developed to create access to specialty care for Hepatitis C in rural areas and expanded to serve prisoners. Project ECHO has been supported by the state's Medicaid managed care organizations (MCOs), written into state law, and given an annual allocation of funds. Prior to HCIA, however, Project ECHO's telementoring program was specific to particular diseases, not holistic for patients with major comorbid conditions (MCCs).

U New Mexico project leadership describes the ECHO Care approach as part of delivery system reform within the state. ECHO Care serves complex adult patients across New Mexico, with emphasis on specialty care co-management, through a weekly complex care clinic, topic-based training, and support to dedicated interprofessional Outpatient Intensivist Teams (OITs) hosted at partner sites. Medicaid assigns each OIT as the primary care provider to an ECHO Care participant. Full implementation was delayed almost a year post-award (the grant was approved in October 2012 and launched in September 2013) due to changes in the relationships between the state Medicaid program and Medicaid managed care vendors, which were consolidated into four health plans. An initial plan to create ten sites across New Mexico was scaled back to six during the initial performance period. There are presently five sites.

Goals. Although U New Mexico shares the CMMI core metrics of reducing utilization, improving quality of care, and, perhaps most importantly, reducing Medicaid costs for enrolled beneficiaries, the awardee has identified objectives that are more likely to show improvement over the 3-year HCIA performance period, given the medical complexity of participants. These measures include improved disease management and access to specialty care, increased length of time (in months) for beneficiary enrollment in ECHO Care, and successful development of a transitional care plan.

Program Models and Practices. ECHO Care is a workforce intervention designed to engage university-based specialists in care management for hard-to-reach, complex patients, and to train interprofessional primary care teams that include nonclinical staff (CHWs) in clinical care for complex conditions. The model also includes patient engagement, navigation, and referrals to community supports. The OITs offer after-hours access and home visits, and are intended to deliver integrated care (e.g., medical, behavioral, social), through the mentorship of university-based specialists.

Implementation Updates. NORC's Second Annual Report (2016) includes HCIA awardee self-reported data through March 31, 2015, as well as data gathered by NORC through July 1, 2015. U New Mexico continued to generate self-reported data for the final 90 days of the initial period of performance (April 1 through June 30, 2015) and into its no-cost extension year, scheduled to be completed on June 30, 2016. Key developments related to implementation since the preparation of NORC's Second Annual Report include the following:

- **Shift in Recruitment Methods.** Project leadership describes targeting the highest utilizers of health care with the most challenging diagnoses—often behavioral health or substance abuse. Over the implementation period, ECHO Care responded to difficulties in recruiting by soliciting referrals from partner Medicaid MCOs and hospital discharge planners. This strategy supplements the use of a Medicaid claims-based algorithm to identify prospective enrollees, prepared by subcontractor New York University (NYU). The newer strategy adds the use of a dedicated recruiter, who conducts outreach in community settings and regularly meets with hospital discharge planning staff.

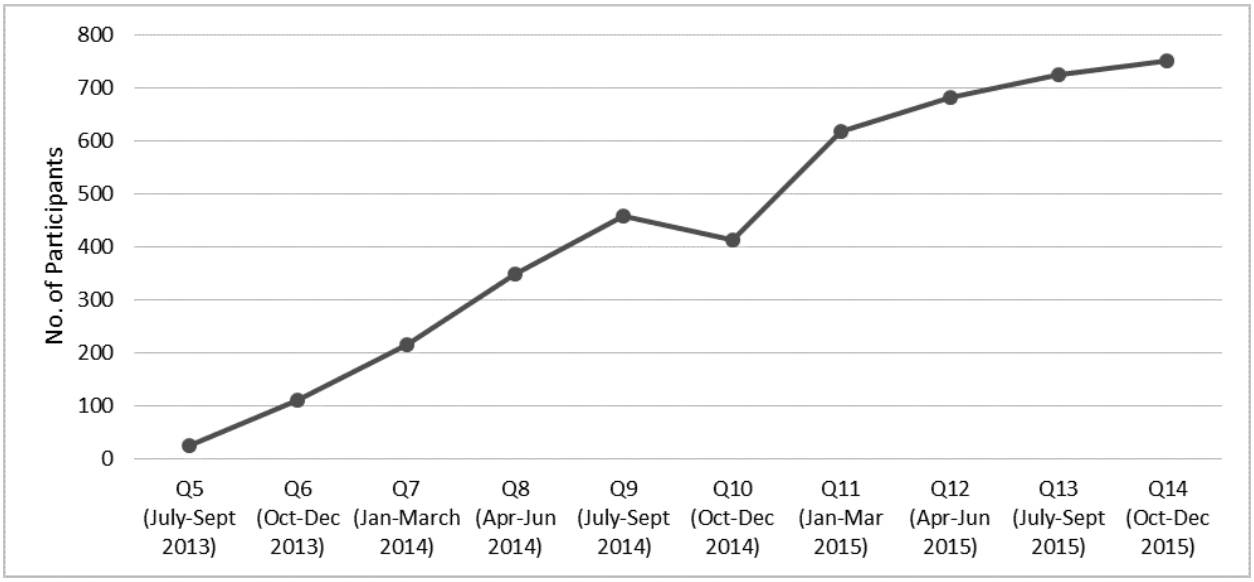
> "We continue to use the same strategies – relying on referrals from the managed care organizations, primarily those come from the care coordinator, as well as attending discharge rounds and recruiting patients from the hospital. To a lesser degree, getting referrals from within the provider sites where our teams are located….What we talk about with the MCOs is either having a specific number of referrals that they commit to a month or committing to an automated system. So, whichever patients meet these criteria would be referred. Now, it's a little more of gut feel about patients. They pick the right patients, we [are] certainly getting high need patients but we recognize that referral systems need to be more robust in the future." –Project leadership

- **Greater Stability in Staffing.** ECHO Care reports increasing stability of OITs in recent months, with diminished turnover and lengthened staff tenure. During the NCE period, the awardee added staff training on behavioral health to better prepare OITs for high acuity patients, as well as counseling and supports to mitigate staff burnout.
- **Working relationship with Medicaid Health Plans and Provider Sites.** Project leadership describes the past year as marked by a shared understanding with Medicaid MCO partners about the feasibility of the ECHO Care model, as well as greater involvement of Medicaid MCO care managers in the weekly complex care clinics. There is a new focus on negotiating the details of sustainability, for example, in coordinating the performance of a beneficiary's initial needs assessment, rather than having both ECHO Care and a Medicaid care manager perform similar tasks, and in the state Medicaid agency's decision to allow delegation of care management to OITs. In addition, ECHO Care managers describe a greater degree of inclusion of OITs by their respective host sites, with attention to integrating the HCIA-funded clinicians into the routine delivery of care.
- **Data Sharing and Interoperability of Health IT.** The awardee began with a dedicated health IT system and software to enable communication between the Albuquerque-based program office and the OITs, with a web-based portal allowing OITs to enter data for review by the ECHO Care program office. The ECHO Health data system introduced during summer 2014 moved ECHO Care closer to interoperability among the EHR systems of partner sites, Medicaid managed care plans, and U New Mexico, creating a single repository for patient enrollment data and the prospect of generating timely reporting across the project. The current focus is on reducing the need for entering patient data more than once.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from U New Mexico provides participation by HCIA reporting quarter, as seen in Exhibit ECHO.1. There has been an overall increase over time, with a plateau in Q10. During the most recent quarter for which data are available (October 1 through December 31, 2015), the awardee reports enrolling 43 beneficiaries; to date it has served a total of 750 beneficiaries. For the group of beneficiaries participating in ECHO Care during the calendar year 2015, through December 31, 2015. Almost one-third are ages 50 to 59 years (32 percent),

with 39 percent ages 30 to 49, 16 percent ages 60 and older, and 13 percent ages 20 to 29. Just over half are female (51 percent). The awardee does not report racial/ethnic identity of its enrollees to CMMI.[266]

Exhibit ECHO.1: Total Number of ECHO Care Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

Project ECHO lowers the cost of care for Medicaid beneficiaries. We observe no clear impacts on other measures of utilization.

In the section below we present our analysis of program effectiveness, based on three types of data: claims (Medicaid); surveys from ECHO Care's internal survey of participants and of its workforce; and narrative from NORC interviews and site visit.

Core and Supplemental Measures

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- Emergency Department Visits
- 30-day Readmissions
- Potentially Avoidable Hospitalizations (PAH)

Our community (ambulatory care) analysis compares the experiences of U New Mexico participants with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's ECHO Care program over the entire enrollment period as a whole and in each quarter of enrollment. Our analysis is for Medicaid managed care beneficiaries enrolled in ECHO Care from October 1, 2013, through June 30, 2015, comprising 100 percent of all ECHO Care participants.

Finder File and Creation of Analytic Sample. NORC received claims data from New Mexico from an internal evaluation at NYU. NYU provided a finder file of program participants and enrollment dates for

[266] Data in this paragraph are drawn from ECHO Care's narrative progress report to CMMI for HCIA Reporting Quarter 14.

the ECHO program, enabling us to use Medicaid claims to calculate outcome measures. We identified 746 unique beneficiaries and further limited this number by age, claims available, and Medicaid identifiers, yielding an analytic sample of 553 beneficiaries.

Comparison Group. Using Medicaid claims for beneficiaries throughout the state, we select comparison beneficiaries for the two years prior to and after the intervention. We use propensity score matching to find appropriate comparators.[267] We then match comparison beneficiaries to ECHO participants with similar propensity scores.[268] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.

Descriptive Characteristics. Exhibit ECHO.2 displays the descriptive characteristics of beneficiaries in the treatment and comparison group, with respect to demographics, comorbidities, and prior utilization.[269] ECHO beneficiaries are more likely to be Black, dually enrolled in both Medicare and Medicaid, and have higher rates of hospitalizations.

[267] For more information on propensity score matching, please refer to Appendix C.

[268] The final propensity score model includes the following covariates: age, gender, race, ethnicity, dual coverage, a measure of comorbidity (the JEN Frailty Score), counts of prior-year hospitalizations and ED visits, and days covered under Medicaid in the previous year. For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[269] We tested differences between the groups with a t-test for continuous measures (utilization in year prior to enrollment) and a chi-square test for categorical parameters (gender, age group, race/ethnicity, dual eligibility, coverage reason, and Jen Frailty Score).

Exhibit ECHO.2: Descriptive Characteristics for ECHO Care and Comparison Group Beneficiaries

Variable	ECHO	Comparison
Number of Beneficiaries	553	553
Gender % (N)		
Female	50.8 (281)	51.0 (282)
Age Group (N)		
18 to 25 years	6.3 (35)	5.8 (32)
26 to 64 years	92.4 (511)	92.6 (512)
>65 years	1.3 (7)	1.6 (9)
Race/Ethnicity (N) * **		
White	67.6 (374)	65.5 (362)
Black	3.4 (19)	1.3 (7)
Hispanic	24.1 (133)	25.1 (139)
Other	4.9 (27)	8.1 (45)
Dual Eligibility (N) * **		
Dually Enrolled	5.4 (30)	5.1 (28)
Hierarchical Chronic Conditions (HCC)		
Jen Frailty Score (Standard Deviation)	7.0 (1.9)	7.0 (2.0)
Mean Utilization in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Hospitalizations (SD) ***	1552.8 (2365.0)	1095.1 (1570.7)
ED Visits (SD)	2128.4 (1226.1)	2137.4 (1217.0)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of ECHO Care. Exhibit ECHO.3 shows the average quarterly and aggregate impact of the ECHO program on its participants relative to the comparison group.[270] Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[271] We find the following for the ECHO program, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$2,044 per beneficiary per quarter).
- **Utilization Measures:** Non-significant decreases in hospitalizations and readmissions.
- **Quality of Care:** A non-significant decrease in potentially avoidable hospitalizations.

Exhibit ECHO.3: Impact of ECHO Care on Outcomes

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary ($)	**-$2,044 [-$2,968; -$1,120]*** **
All-cause Hospitalizations	-16 [-39, 7]
Emergency Department Visits	13 [-19, 45]
Readmissions	-39 [-101, 23]
Potentially Avoidable Hospitalizations	-9 [-23, 5]

[270] Adjustment factors include age category, race/ethnicity, dual eligibility, JEN Frailty score, and a disability indicator.

[271] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

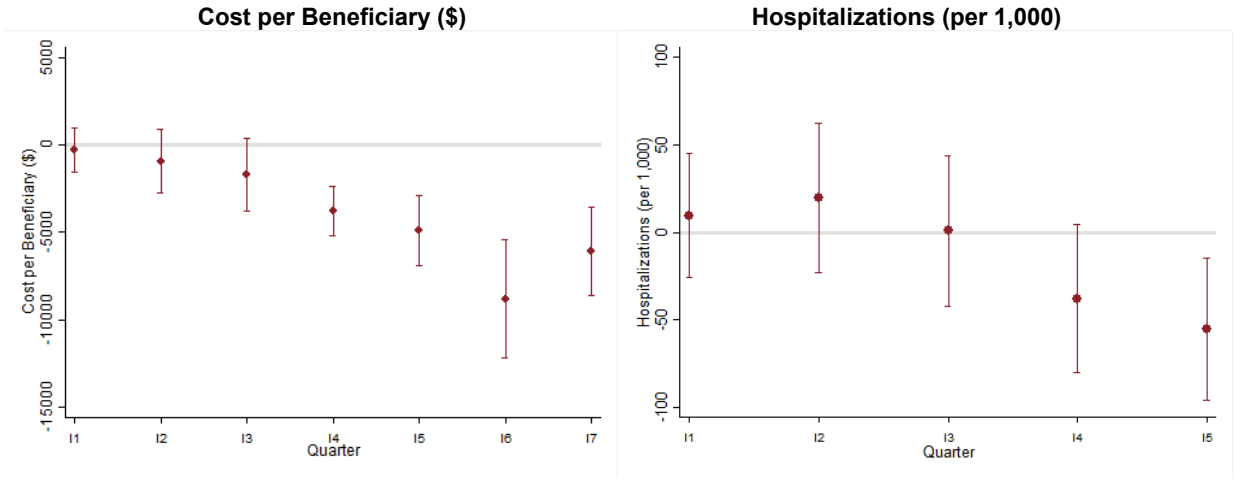
AVERAGE QUARTERLY IMPACT[§]	
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$4,889,750 [-$7,100,083; -$2,679,417] *** **
All-cause Hospitalizations	-39 [-93, 15]
Emergency Department Visits	31 [-45, 107]
Readmissions	-11 [-28, 6]
Potentially Avoidable Hospitalizations	-22 [-57,13]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (553), with an average length of program enrollment of five quarters, ranging from 1-6 quarters.

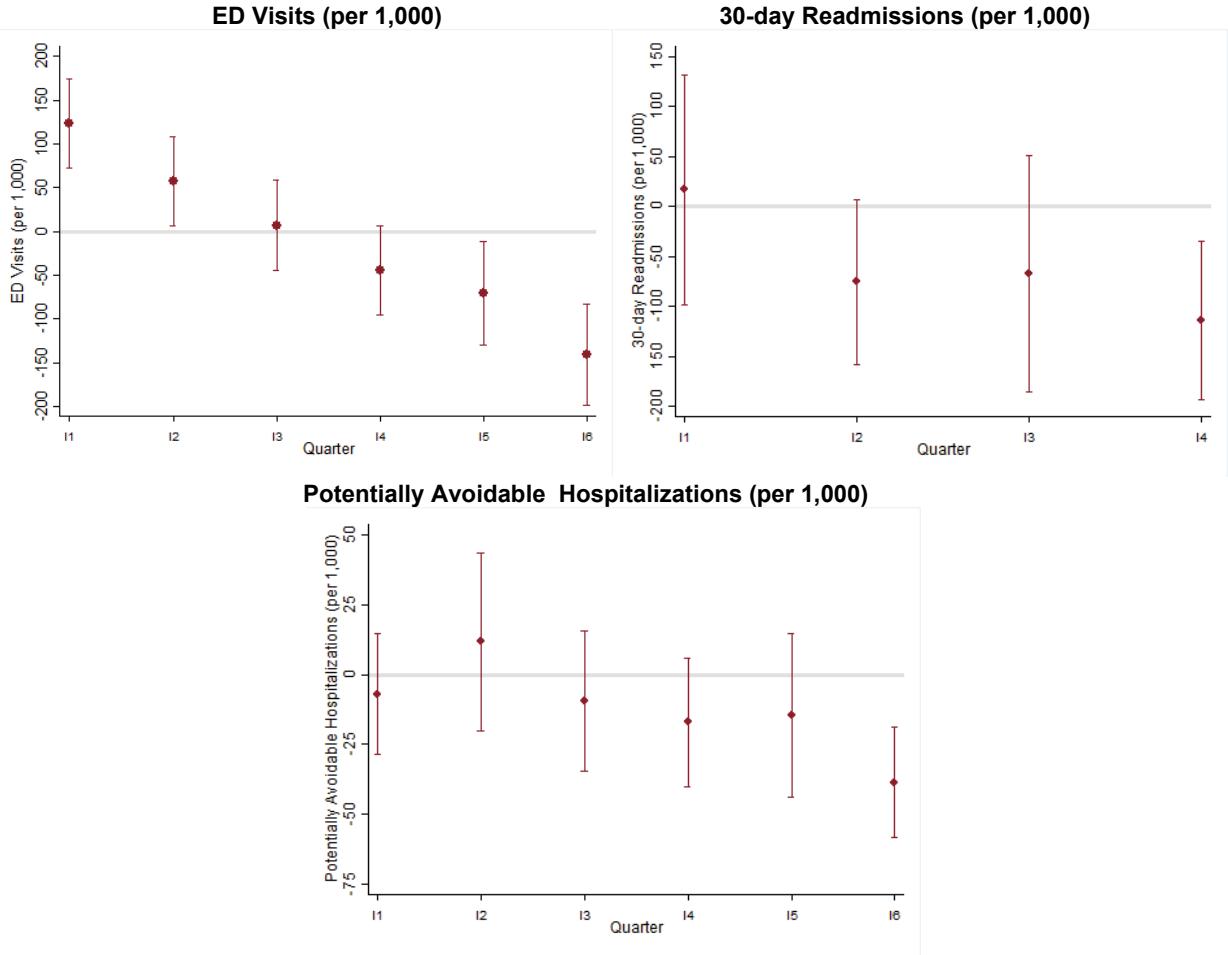
Impact of ECHO Care in Each Quarter of Enrollment. Findings from a quarterly fixed effects (QFE) DID model of impact in each intervention enrollment quarter indicate positive effects after a beneficiary's first year in ECHO Care. Exhibit ECHO.4 displays the adjusted marginal effect of the intervention in each post-intervention quarter.[272] The effect is displayed as the average difference (and 90 percent confidence interval) between treatment and comparison groups per 1,000 participants for each quarter. We find the following, with respect to the comparison group:

- **Cost:** A statistically significant decrease for beneficiaries in their second year of enrollment, starting with quarter I4.
- **Utilization Measures:** Decreases in hospitalizations and emergency department visits that are not statistically significant in early quarters of enrollment but that reach significance in a beneficiary's second year (quarter I5).
- **Quality of Care:** As with utilization measures, a decrease in potentially avoidable hospitalizations that becomes statistically significant in quarter I6.

Exhibit ECHO.4: Impact of the ECHO Care Program on Outcomes, by Quarter



[272] Adjustment factors include age category, race/ethnicity, dual eligibility, JEN Frailty score, and a disability indicator.



Quality of Care (Survey and Qualitative Findings)

NORC's evaluation uses qualitative data and the awardee's survey findings to assess the impact of ECHO Care on quality of care, as measured in terms of timeliness of services delivery, and beneficiary experience and satisfaction. In our Second Annual Report (2016), we summarized ECHO Care's internal survey of beneficiary experience (n=196 at baseline, n=56 at six month follow-up). In addition, findings are based on qualitative data gathered through interviews, review of program documents, and one site visit (October 2014), which includes one focus group with enrollees and direct observations.

"The most important behavioral health intervention that we have been able to offer is attachment. The majority of these patients have come from disadvantaged, violent, disruptive backgrounds. A pretty common theme is that they haven't had people in their life that they can trust and connect with…we hear again and again that the reason that their health has started to improve in working with these teams is because they finally feel like somebody really sees them and cares about them. The intervention is really the engagement, the building of trust and support for the patient that has been continuous over a couple of years. It's a necessary first step for patients to really engage in anything that you might otherwise recognize as behavioral health care." –Project leadership

Timeliness of Services Delivery. Beneficiaries report more timely services once enrolled in ECHO Care. According to the awardee's survey, at enrollment (survey baseline), 25 to 35 percent of patients report that care was timely or accessible,

including ability to receive care, make appointments, or obtain answers to medical questions. Six months following the baseline survey, however, between 50 and 76 percent of respondents describe their care as timely and accessible. In an NORC-facilitated focus group, one rural participant with multiple sclerosis explained how ECHO Care enabled local management between trips to Albuquerque to see specialists.

Beneficiary Experience and Satisfaction. ECHO Care's survey finds a substantial rise in patient satisfaction from baseline (28 percent) to 6 months post-enrollment (56 percent), and at 12 months post (71 percent). There is a similar increase in satisfaction with care planning, care coordination, and quality of relationship with the provider; there is somewhat less satisfaction in obtaining a written copy of a treatment plan and receiving enough education to care for health. In NORC-facilitated focus groups, participants praise ECHO Care's home visits, goal setting, patient navigation, and arranging for transportation.

> "Longevity of patients in the program is determined by so many different factors that it's kind of hard to use it, if you will, as a measure of quality or an outcome, in and of itself. If the patient loses Medicaid coverage, they are cut off from the program. If they gain Medicare coverage, they're usually cut off from the program. They may move away, be incarcerated, have an extended hospitalization in a SNF, be transferred to long-term care, be transferred to hospice, or die. There are a lot of different reasons that those relationships can get severed, in addition to a patient deciding to leave because they are mad or something." –Project leadership

Workforce Development

Staffing. ECHO Care includes an implementation team based at Albuquerque and an interdisciplinary clinical OIT at each host site. Fully staffed, each OIT consists of one nurse practitioner or physician assistant, one RN, two CHWs, one counselor or social worker, one administrative assistant, and a part-time physician. However, most sites have experienced high turnover and may not have a full complement of staff as described at any given time in the implementation period. NORC's Second Annual Report to CMMI (2016) included summary findings from ECHO Care's 2015 internal survey of OIT staff (n=22). Overall, most report satisfaction with their jobs (86 percent) and with the ECHO Care model (82 percent); describe having major new responsibilities as part of the OIT that they see as effective in improving patient care (73 percent); and agree or strongly agree that the ECHO Care team is committed to working together to provide good patient care (96 percent). However, just over half (55 percent) express some frustration with a perceived lack of clarity about leadership.

ECHO Care has demonstrated the successful integration of CHWs into clinical teams. Each of these lay health workers leads their respective OITs in addressing social factors of health that impede access to care. Integration of CHWs into the clinical team has become more complete over time. During NORC's site visit in October 2014, U New Mexico specialists reported a much greater appreciation for the CHWs' perspectives on participants' conditions and needs, and the life challenges the participants face.

Training. Weekly video-enabled training and specialty care co-management—what the awardee calls "telementoring"—are at the heart of the ECHO Care model. In addition, ECHO Care trains OIT members to use its dedicated equipment and health IT, and in recent months, has trained them in behavioral health interventions (e.g., motivational interviewing, relaxation techniques). ECHO Care's internal survey of staff finds mixed reviews for the training experience: about one-third of respondents (32 percent) say that training enhanced patient care, while 41 percent report that training didn't adequately prepare them for their jobs. During the NCE period, project leadership has developed video versions of training to support sustainability of the model.

> "You learn on the job. Experience and knowing the community also helps. I did find the motivational interviewing practice helpful, but it's a constant learning experience. It's the combination of all the education and the experience. The medical training is helpful, too, to understand the medical conditions." -Workforce Focus Group Participant

Implications for Workforce. The ECHO Care model offers one promising approach to mitigating the shortage of specialty care in rural areas. In addition, the awardee's internal workforce survey (n=22) identifies positive impacts on the careers of OIT staff, with respondents expressing positive views about their work and their colleagues. Seventy three percent of respondents report being connected to peers for professional advice and consultation, and most staff (64 to 87 percent, depending on the item) respect their fellow team members, are willing to share responsibility, and feel they continue to gain expertise through their work.

Context: ECHO Care in Its Third Year

As noted in NORC's Second Annual Report (2016), ECHO Care leadership is navigating significant change in the state's Medicaid program, in an effort to fully integrate the HCIA-funded model into existing Project ECHO programs supported by the awardee's dedicated center, which has a global reach.

External Factors. Ongoing change in the Medicaid program has framed ECHO Care from launch through the no-cost extension period, as the intervention targets Medicaid beneficiaries and works closely with Medicaid-supported safety net providers and Medicaid MCOs across the state. In the past year, an economic downturn has caused significant budget cuts in the Medicaid program, making demonstration of a business case for ECHO Care even more critical. State scope of practice statutes are another important contextual factor; reliance on both nurse practitioners and physician assistants to deliver primary care, as authorized by New Mexico state law, has enabled ECHO Care to lower costs for its model and more effectively fill staff positions, despite health care market shortages of physicians.

> "An interesting barrier that I don't think we would have anticipated on the clinic side is that we started the grant with a financial model that's cost-based reimbursement. As much as that has been a pain for everybody, it's administratively burdensome, it's financially safe. I think just getting your head around a new payment system, these more modern payment systems, they're kind [of] designed to expect the providers to take on more risk. I think just watching the clinics absorb that idea, it's a challenge." – Project leadership

Internal Factors. The awardee's organizational capacity and its success in integrating CHWs as part of the clinical OIT support the continued success of the HCIA-funded intervention. While ECHO Care 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, who are asked to address the problems of patients with multimorbidities. In addition, the ECHO Care central staff must establish and situate multidisciplinary OITs rather than interact with existing primary care providers, as Project ECHO's individual specialty clinics do. ECHO Care has also commissioned a multifaceted qualitative evaluation that it describes as taking an "ecosystems" approach to understanding the range of impacts on beneficiaries, their families, providers, and the Medicaid MCOs.

Sustaining the ECHO Care Program

As noted in NORC's Second Annual Report, U New Mexico has been negotiating actively with both Medicaid MCOs and the state Medicaid office to integrate ECHO Care into ongoing budgets and operations, by means of a per-patient per-month or shared savings model with the clinical sites.

Sustainability. Five of six OIT clinics have continued operations into the NCE period; one Albuquerque-based clinic was closed in response to Medicaid MCO concern that there were too many sites in the area. As noted in the previous discussion of contextual factors, project leadership is focusing its efforts during the NCE year on negotiations with New Mexico's Medicaid program and MCO partners. ECHO Care is trying to demonstrate cost savings in excess of projected administrative and clinical costs, and to craft modifications to its model, such as modifying the initial financial model so that incentives favor Medicaid MCO participation.

"Negotiating with MCOs to attempt to achieve sustainability is a very challenging process and one that is ongoing. It's also, unfortunately, coinciding with the huge state financial crisis because so much of the NM economy is dependent on oil and gas revenues. State Medicaid has a huge deficit and is cutting reimbursement rates to the MCOs…We're definitely experiencing some of the backlash from that." – Project leadership

Replicability and Scaling. There are no plans to replicate or scale the Project ECHO model beyond its current operations at the five sites across New Mexico. However, the ECHO Care model of telementoring on which Project ECHO is based, has been successfully replicated and scaled both nationally and internationally.

Summary

We find significantly lower total costs of care for ECHO Medicaid program participants, relative to a comparison group. Observed decreases in utilization (hospitalizations and ED visits), and quality of care (potentially avoidable hospitalizations) do not reach statistical significance overall but are significant for beneficiaries in their second year of ECHO Care enrollment. The relatively small number of claims from later implementation quarters means that these findings should be interpreted with caution; further analysis with more quarters of data would help provide a clearer understanding of program impact.[273] NORC's findings are consistent with the awardee's internal analyses, prepared by NYU using Medicaid claims data through April 2015 but without an external comparison group (awardee's Q14 narrative progress report to CMMI). Compared with claims experience in the 12 months prior to ECHO Care

[273] We are limited in reporting practitioner follow-up visits, as these were likely to be included as part of the intervention (ECHO Care OIT visits) and therefore not billed separately; as a result, data on primary care visits for ECHO participants may be incomplete. In addition, looking at program impacts overall (summative DID), there may be declines in the number of events per beneficiary each quarter, as we observe declines in cost but do not observe decreases in beneficiaries with any events.

enrollment, beneficiaries see a -$469 decrease in per-member per-month (PMPM) cost in the first 12 months of enrollment and a -$774 decrease in PMPM cost over the first 24 months; a 27 percent decrease in non-obstetrical hospitalizations in the first 12 months and a 59 percent decrease over the first 24 months; a 32 percent decrease in ED visits in the first 12 months and a 62 percent decrease over the first 24 months; and no change in the number of 30-day hospital readmissions. Pharmacy costs increased by 31 percent in the first 12 months and by 80 percent over the first 24 months, likely reflecting improved access to care and needed medications.

In addition to reporting promising findings of reduced costs and utilization, ECHO Care offers ample evidence of a successful intervention. It receives high marks for satisfaction from beneficiaries and staff alike, an ongoing commitment to developing and sharing timely data among intervention partners for the purpose of midstream modifications to the ECHO Care model, and significant involvement by project leadership in negotiating with the state Medicaid agency, its Medicaid managed care partners, and project sites to develop a sustainable business model within the state of New Mexico.

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University of North Texas

Brookdale Senior Living Transitions of Care (BSLTOC). The University of North Texas and its primary partner, Brookdale Senior Living (BSL), created this program to adapt INTERACT quality improvement tools for use in selected BSL skilled nursing facilities (SNFs); assisted living/memory care (AL/MC) and independent living (IL) residences; and home health agencies.

PROGRAM MODELS: Advance Care Planning, Beneficiary/Caregiver Engagement, Care/Case Coordination, Clinician Decision Supports, Home Health/Home Care, Transitional Care

LOCATION: Colorado, Florida, Kansas, Tennessee, Texas

GRANT: $7,329,714

AWARD DATES: 11/30/12 to 6/30/16

NO-COST EXTENSION: N/A

PAYER(S): Medicare

REACH: Cumulative count unavailable

POPULATIONS: Older Adults, Disability

DATA: Medicare, claims (1/13-6/15); 2 site visits (2014, 2015); telephone interviews with awardee (2014-2016)

IMPLEMENTATION

- Implementation has been staggered across different intervention arms, BSL residences, and states.
- Data exchange relationships with high-referral hospitals and feedback to BSL residences enabled quality improvement.
- Partnership with analytics vendor supported development of data warehouse and tools that enable near real-time sharing of resident data.

WORKFORCE

- Clinical and non-clinical staff at selected BSL residences received ongoing training on use of selected INTERACT tools.
- High turnover in residential community labor force made staff retention challenging.

CONTEXT

- BSL merged with Emeritus in 2014, substantially expanding company size.
- Hospitals' readmission penalties are seen as an incentive for hospital partnership

OUTCOMES§

COST

- Decrease in total SNF 30-day cost of care (-$449 per beneficiary-episode per quarter)
- Decrease in total AL/MC cost of care (-$1,095 per beneficiary per quarter)
- Decrease in AL/MC total cost of care in the last 30 days of life (-$861 per beneficiary per quarter) and last 90 days of life (-$2,122 per beneficiary per quarter)

UTILIZATION

- Decrease in AL/MC hospitalizations (-26 per 1,000 beneficiaries per quarter) and 30-day readmissions (-336 per 1,000 beneficiaries per quarter)

QUALITY

- Decrease in AL/MC ambulatory care-sensitive hospitalizations (-6 per 1,000 beneficiaries per quarter)

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

BSL has integrated INTERACT protocols into its PointClickCare EHR for its SNFs and plans to maintain data exchange relationships with partner hospitals in selected markets. A modified version of INTERACT, integrated with EHR, is being supported for BSL AL residences and home health agencies.

REPLICABILITY & SCALING

Awardee leadership describe plans to scale selected INTERACT tools or modified versions of INTERACT across all BSL residences. BSL staff members are serving as consultants to other continuing care retirement communities interested in implementing INTERACT; BSL also plans to offer transitional care coordination as a service to partner acute care hospitals.

§Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and are statistically significant at the P<0.10 level.

Overview of Brookdale Senior Living Transitions of Care

Background. The University of North Texas, with its partner Brookdale Senior Living (BSL), has adapted a set of quality improvement tools, the evidence-based Interventions to Reduce Acute Care Transfers (INTERACT) suite. The two partners created the Brookdale Senior Living Transitions of Care (BSLTOC), which uses INTERACT in skilled nursing facilities (SNFs), as well as assisted living (AL), memory care (MC), independent living (IL), and home health (HH) settings affiliated with BSL residences in five states. BSLTOC builds on a care transitions program that BSL tested previously in 11 SNFs across eight states. While the University of North Texas monitors and coordinates the intervention, BSL has implemented the HCIA-funded intervention in selected communities, including developing new partnerships with hospitals, actively exchanging data with hospital partners on the discharge of BSL residents, and collaborating with a data analytics firm (Loopback Analytics) that develops and manages in-house analyses. NORC visited two sites where the intervention was described as highest functioning: Austin, Texas, and Jacksonville, Florida.

Exhibit BSLTOC.1. Number of Implementation Sites, Brookdale Senior Living

Year	Number of BSL Residences and Agencies Where Implemented			
	Skilled Nursing (SNF)	Assisted Living/ Memory Care (AL/MC)	Home Health (HH)	Independent Living (IL)
1	11	2	n/a	n/a
2	14	46	10	2
3	n/a	n/a	1	3
totals	25	48	11	5

During the first year after receiving the award, the project experienced significant launch delays stemming from difficulties hiring key intervention staff and negotiations with Florida Atlantic University regarding permission to use proprietary INTERACT software. During this period, Brookdale was also in the midst of a corporate merger with a much larger senior living corporation, Emeritus; however, this merger did not appear to substantially delay or influence BSL's implementation. Full implementation began in April 2014, over a year after the grant was awarded. The HCIA-funded intervention was implemented with over 11,000 residents in BSL communities across Texas, Florida, Colorado, Tennessee, and Kansas.

Under the BSLTOC program, BSL has developed active data-sharing agreements with over 100 partner hospitals. According to awardee leadership, negotiation of these agreements has presented the most challenging aspect of implementation, particularly when it involves the larger health care systems. Within the broader context of hospital penalties for readmissions under Medicare, hospitals have become more receptive to partnership with BSL in lowering readmissions; anticipated future penalties for readmissions from SNFs in 2018 are seen as an opportunity to further scale and spread the BSLTOC model to other organizations that operate SNFs.

Goals. The CMMI core performance metrics are central to the BSLTOC intervention, especially those of reducing hospital readmissions and emergency department (ED) visits. Quality improvement and related process goals are also important in gauging success. These include the number of data-sharing relationships with hospitals to whom BSL frequently transfers residents (high-referral hospitals); the

number of weekly collaborative care (quality improvement) meetings in which BSL staff and implementation partners review new acute care transfers; and the frequency of advance care planning conversations with BSL residents.

Exhibit BSLTOC.2. INTERACT Tools Used, by Setting

Tools used at BSL residences	SNF	AL/MC	HH	IL
Advance Care Planning Tracking	■	■	■	■
SBAR (Situation, Background, Appearance, Ready to Call) Note	■	■	■	
Stop & Watch Early Warning Form	■	■	■	■
Stop & Watch Family Reference Guide				■
Tools used in connection with transfer to/from hospital				
Hospital Transfer Form				
Medication Reconciliation Form				
Quality Improvement Tool for Review of Acute Care Transfers				

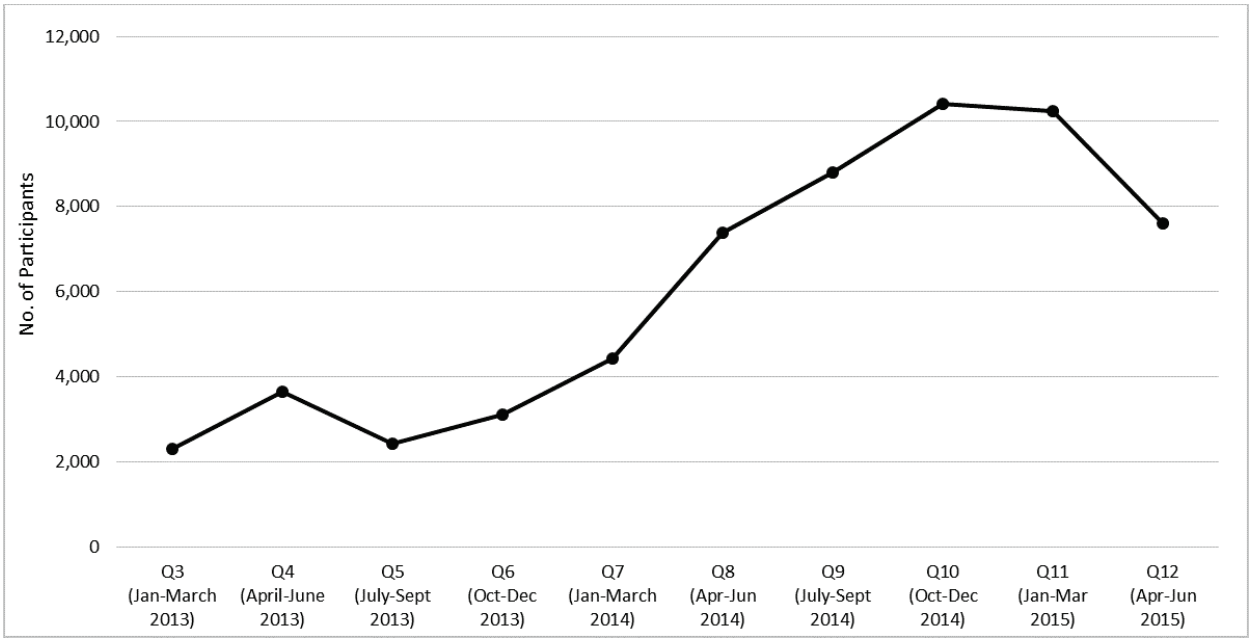
Program Models and Practices. BSL's pilot with HCIA One funding was a first step toward adopting modified versions of INTERACT's quality improvement, care coordination, and advance care planning tools across the corporation's SNFs and AL/MC residences, home health agencies, and selected independent living residences (see text box at right for a summary list of tools). As part of implementation, BSL created regional training and implementation teams that operate under a central corporate manager. INTERACT includes tools and modules to facilitate communications among clinical and non-clinical BSL staff (associates), and between BSL and hospitals to which BSL-affiliated residents and home health clients are admitted and from which they are discharged.

Implementation Updates. As the awardee did not receive a no-cost extension, almost all data related to BSLTOC were analyzed and presented in earlier NORC reports to CMMI. Noteworthy observations since preparation of NORC's Second Annual Report include the following:

- **Advance Care Planning.** Advance care planning (ACP) is an aspect of patient engagement and caregiver support within the intervention. In 2015, BSL convened an ACP learning collaborative with a small group of BSL communities, committing management resources and time toward enriching ACP conversations with residents. BSL leadership indicated that the introduction of ACP with residents in AL and IL settings has been positively received.
- **Health Information Technology.** Loopback Analytics has created a data warehouse and related infrastructure to support the innovation and facilitate data-sharing with partner hospitals. Within BSL, implementation has involved redundancies (dual entry of data necessitated by use of paper versions of INTERACT tools outside of the SNF setting and entry into the residence's EHR, including MedEx and Homecare Homebase); a new SNF platform called PointClickCare, which integrates INTERACT tools; and BSL's own version of INTERACT software for post-HCIA implementation outside of SNF settings, which is in development.
- **Fidelity to Program Model and Capacity for Midstream Adaptation.** The University of North Texas and BSL appear to maintain collaborative and functioning partnerships that include the sharing of data and analyses among implementation partners and high-referral hospitals. This capacity to maintain fidelity to the intervention model, provide feedback to the awardee's leadership team, and learn from this feedback is a hallmark of a mature and successful intervention.

Reach and Demographic Profile of Enrolled Beneficiaries. Self-reported data from the University of North Texas provide participation by HCIA reporting quarter, as seen in Exhibit BSLTOC.3. There was a general increase over time through Q10, followed by declining participation through Q12, the final quarter of the award. For the group of residents participating in the BLSTOC intervention during the period from April 1 through June 30, 2015, most were female (70 percent) and 75 years of age or older (85 percent). The awardee's self-reported data to CMMI do not include details of participants' racial or ethnic identity.

Exhibit BSLTOC.3: Total Number of BSLTOC Participants, by HCIA Reporting Quarter



Summative Findings (Outcomes)

The BSLTOC program reduces 30-day total cost of care for SNF residents. Additionally, we find reductions in hospitalizations, readmissions, and total cost of care for AL residents. We also observe reductions in cost outcomes for AL residents in the last 30 and 90 days of life.

In the section below, we present our analyses of program effectiveness, based on two types of data: Medicare Fee-For-Service (FFS) claims and narrative from NORC interviews and site visits. Our claims-based analysis includes three separate analyses, looking at the experiences of SNF residences, AL/MC residents, and AL/MC residents in their last 30 and 90 days of life.

Core and Supplemental Measures: Skilled Nursing Facilities

Our SNF analysis compares the experiences of University of North Texas enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardees' BSLTOC intervention over the implementation period as a whole and in each quarter of

program implementation. Our analysis is for Medicare Fee-For-Service beneficiaries, comprising 83 percent of all BSLTOC SNF enrollees.[274]

Measures (per 1,000 beneficiary-episodes unless noted)
- 30-day Total Cost of Care per beneficiary-episode
- 90-day Total Cost of Care per beneficiary-episode
- 90-day Hospitalizations
- 90-day ED Visits
- 30-day Readmissions

Finder File and Creation of Analytic Sample, SNF. BSL provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[275] We identified 31,273 unique beneficiary-episodes, of which 7,613 were matched to a Medicare identifier, enrolled in Medicare FFS at the time of SNF admission, and occurred in the post-intervention period. We then dropped any BSLTOC SNF beneficiary-episodes occurring within 90 days of any previous BSLTOC SNF beneficiary-episode for the same individual, to create a "clean period" to account for overlapping SNF claims. This yielded a sample of 6,828 beneficiary-episodes for the BSLTOC SNF program in the post-intervention period.

Comparison Group, SNF. We use Medicare claims to identify a comparison group of beneficiary-episodes discharged to 55 non-BSLTOC SNFs associated with 25 hospitals that discharge a large volume of patients (greater than 100 episodes) to 14 Brookdale SNFs. We select comparison SNFs based on number of admissions from partner hospital (at least 50), similarity in size to the respective BSL SNF, and best match on cost and demographic variables. We use propensity score weighting (standardized mortality ratio weighting) to minimize observed differences in beneficiary-episode characteristics between the BSLTOC treatment and comparison groups. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[276]

Descriptive Characteristics, SNF. Exhibit BSLTOC.4 displays the characteristics of BSLTOC SNF beneficiary-episodes for the treatment and comparison groups before and after implementation of the intervention. We compare SNF admissions occurring in the post-intervention periods with respect to demographics, comorbidities, and prior utilization.[277] Descriptive statistics are based on findings prior to propensity score weighting. Beneficiary-episodes attributed to the BSLTOC SNFs are significantly more likely to be older, White, have a lower hierarchical chronic condition (HCC) score and fewer total HCCs, be covered due to age, and have lower cost and fewer hospitalizations in the year prior to enrollment.

[274] Estimated percentage of Medicare FFS participation is cumulative, based on the finder file, rather than cross-sectional, based on awardee self-reported data. See Appendix C for more information about our analysis.

[275] Medicare claims are available through December 31, 2015, for this report. We used June 30, 2015, as the cut-off date, reflecting the end date of the awardee's period of performance with HCIA support.

[276] For more detailed information on propensity score weighting and test of common support and covariate balance, please refer to Appendix D.

[277] We test differences between BSLTOC and comparison SNFs during the post-intervention implementation period with a t-test for continuous measures (comorbidities, utilization, and cost) and a chi-square test for categorical parameters (age, race, ethnicity, gender, coverage reason).

Exhibit BSLTOC.4: Descriptive Characteristics for BSLTOC and Comparison Group Beneficiary-Episodes, SNF Analysis

Variable	Pre-Intervention Period		Post-Intervention Period	
	Brookdale	Comparison	Brookdale	Comparison
Number of Beneficiary-Episodes	**6,192**	**13,176**	**6,828**	**17,441**
Gender % (N)				
Female	66.3 (4106)	66.5 (8763)	66.0 (4505)	65.7 (11486)
Age* **				
<65 years	2.3 (141)	5.8 (760)	2.5 (174)	5.9 (1031)
65-69 years	4.5 (277)	7.2 (950)	5.9 (403)	8.2 (1424)
70-74 years	7.8 (485)	10.3 (1360)	9.2 (625)	10.9 (1898)
75-79 years	13.6 (844)	14.4 (1892)	13.2 (904)	14.3 (2488)
80-84 years	21.8 (1350)	20.2 (2667)	19.5 (1334)	19.6 (3420)
≥ 85 years	50.0 (3095)	42.1 (5548)	49.6 (3388)	41.2 (7180)
Race/Ethnicity* **				
White	95.0 (5881)	90.6 (11933)	94.6 (6460)	90.3 (15751)
Black	3.6 (221)	6.9 (914)	3.4 (234)	7.0 (1227)
Other	1.5 (90)	2.5 (329)	2.0 (134)	2.7 (463)
Coverage Reason* **				
Age	92.0 (5699)	85.2 (11226)	90.6 (6188)	84.8 (14812)
Disability	7.6 (469)	13.9 (1826)	8.8 (604)	14.3 (2493)
End-Stage Renal Disease (ESRD)	0.1 (4)	0.3 (37)	0.3 (20)	0.3 (53)
Disability and ESRD	0.3 (20)	0.7 (87)	0.2 (16)	0.6 (113)
Hierarchical Condition Categories (HCCs)				
Mean Count of HCCs (Standard Deviation)***	4.5 (3.0)	4.6 (3.2)	4.6 (3.0)	4.7 (3.2)
Mean HCC Score (SD)***	2.7 (1.6)	2.8 (1.8)	2.8 (1.7)	2.9 (1.8)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 Beneficiary-episodes unless noted)				
Total Medicare Cost (SD)***	$39,392 ($48,546)	$43,779 ($58,960)	$37,910 ($40,154)	$44,386 ($82,232)
Hospitalizations (SD)***	2,056 (2,749)	2,230 (4,797)	2,004 (2,382)	2,215 (5,195)
ED Visits (SD)	968 (1,527)	956 (1,690)	991 (1,666)	985 (1,858)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of BSLTOC Program, SNF. Exhibit BSLTOC.5 presents the average quarterly and aggregate impact of the BSLTOC intervention on its participants relative to the comparison group. We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[278] We find the following, relative to the comparison group:

- **Cost:** A statistically significant decrease in total 30-day quarterly cost of care (-$449 per beneficiary-episode) and a non-significant decrease in total 90-day quarterly cost of care.
- **Utilization Measures:** No significant reductions in 90-day hospitalizations, 90-day ED visits, or 30-day readmissions.

[278] Please see Appendix C for an explanation of our estimate of average quarterly and aggregate impacts. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit BSLTOC.5: Impact of the BSLTOC Program on Outcomes, SNF Analysis

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (Per 1,000 Beneficiary-episodes unless noted)	**Adjusted Estimate 90% Confidence Interval**
30-Day Total Quarterly Cost of Care per Beneficiary-episode ($)	**-$449 [-$817; -$81]****
90-Day Total Quarterly Cost of Care per Beneficiary-episode ($)	-$567 [-$1,293; $159]
90-Day Hospitalizations	3 [-14, 20]
90-Day ED Visits	10 [-5, 25]
30-Day Readmissions	-5 [-19, 9]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate 90% Confidence Interval**
30-Day Total Cost of Care ($)	**-$3,067,186 [-$5,577,946; -$556,426]****
90-Day Total Cost of Care ($)	-$3,873,804 [-$8,829,655; $1,082,047]
90-Day Hospitalizations	19 [-95, 133]
90-Day ED Visits	65 [-34, 164]
30-Day Readmissions	-33 [-127, 61]

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (6,828) and total length of program implementation included in analysis (10 quarters).

Impact of BSLTOC Program in Each Quarter of Enrollment, SNF. Findings from a quarterly fixed effects (QFE) DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core and Supplemental Measures: Assisted Living/Memory Care

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- 30-day Readmissions
- Ambulatory Care-Sensitive (ACS)

Our AL/MC (ambulatory care) analysis compares the experiences of BSL residents in selected AL/MC facilities with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's BSLTOC intervention over the enrollment period as a whole and in each quarter of program enrollment. Our analysis is for Medicare FFS beneficiaries, comprising 45 percent of all BSLTOC AL/MC enrollees.[279]

Finder File and Creation of Analytic Sample, AL/MC. BSL provided a finder file listing program participants and dates on which the intervention became active in AL/MC facilities, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[280] We identified 5,577 unique beneficiaries, and further limited this number by enrollment date, Medicare identifiers, and chronic conditions, yielding an analytic sample of 1,473 beneficiaries.

[279] Estimated percentage of Medicare FFS participation is cumulative, based on the finder file, rather than cross-sectional, based on awardee self-reported data. See Appendix C for more information about our analysis

[280] Medicare claims are available through December 31, 2015, for this report. We used June 30, 2015, as the cut-off date, reflecting the end date of the awardee's period of performance with HCIA support.

Comparison Group, AL/MC. Our study design compares the claims experience of Medicare FFS beneficiaries who live in BSL's AL/MC residences in six counties and those of comparator Medicare FFS beneficiaries who live in AL residences in adjacent counties within the same metropolitan area.[281] We use propensity score matching at the county level to identify comparison counties with similar demographic, health resources availability, and health care utilization characteristics, and at the person level to identify comparator Medicare FFS beneficiaries with similar demographics, prior-year utilization, and comorbidities as treatment group beneficiaries.[282] Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[283]

Descriptive Characteristics, AL/MC. Exhibit BSLTOC.6 displays the descriptive characteristics of beneficiaries in the treatment and comparison groups, with respect to demographics, comorbidities, and prior utilization.[284] Overall, BSLTOC and comparison beneficiaries are similar on measures of gender, age, race/ethnicity, health care utilization, and total cost of care; however, BSLTOC enrollees are less likely to be dually enrolled.

Exhibit BSLTOC.6: Descriptive Characteristics for BSLTOC and Comparison Group Beneficiaries, Assisted Living/Memory Care Analysis

Variable	Brookdale	Comparison
Number of Beneficiaries	1,473	1,473
Mean Number of Quarters Enrolled [Range]	11 [2-16]	11 [2-16]
Gender % (N)		
Female	71.2 (1049)	71.4 (1051)
Age Group % (N)		
<65 years	1.2 (17)	1.0 (15)
65-69 years	2.4 (36)	2.9 (43)
70-74 years	4.3 (64)	5.3 (78)
75-79 years	9.7 (143)	9.6 (142)
80-84 years	20.4 (301)	20.4 (300)
>=85 years	61.9 (912)	60.8 (895)
Race/Ethnicity % (N)		
White	97.1 (1430)	97.4 (1435)
Black	1.4 (20)	1.8 (26)
Other	0.5 (8)	0.2 (3)
Dual Eligibility % (N)		
Dually Enrolled***	1.1 (16)	6.9 (101)
Coverage Reason % (N)		
Age	96.1 (1,415)	95.0 (1399)
Disability	3.9 (57)	5.0 (74)

[281] The six treatment counties include Bexar, Dallas, Harris, Tarrant, and Travis in Texas, and Duval in Florida; the comparison counties include Collin, Montgomery, Williamson, Denton, Galveston, Fort Bend, and Brazoria in Texas, and St. Johns in Florida. The comparison group sample frame consists of Medicare FFS beneficiaries who have had any FFS claim with Place of Service code flagged as an AL residence.

[282] For more information on propensity score matching, please refer to Appendix C.

[283] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[284] We test differences between these groups with 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).

Variable	Brookdale	Comparison
ESRD	0.1 (1)	0.0 (0)
Hierarchical Chronic Conditions (HCC)		
Mean Count of HCCs (Standard Deviation)	5.2 (1.9)	5.2 (2.0)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 Beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD)	$28,549 ($36,077)	$29,215 ($44,371)
Hospitalizations (SD)	762 (1,068)	753 (1,028)
ED Visits (SD)	865 (1,285)	865 (1,205)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of BSLTOC Program, AL/MC. Exhibit BSLTOC.7 displays the average quarterly and aggregate impact of the BSLTOC intervention on its participants relative to the comparison group.[285] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[286] We find the following for the BSLTOC program, relative to the comparison group:

- **Cost:** A statistically significant decrease in total quarterly cost of care (-$1,095 per beneficiary).
- **Utilization measures:** A significant decrease in quarterly hospitalizations (-26 per 1,000 beneficiaries); 30-day readmissions per quarter (-336 per 1,000 beneficiaries); and ACS hospitalizations per quarter (-6 per 1,000 beneficiaries); and a non-significant decrease in ED visits.

Exhibit BSLTOC.7: Impact of BSLTOC Program on Outcomes, Asisted Living/Memory Care Analysis

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Quarterly Cost of Care per Beneficiary ($)	**-$1,095 [-$1,603, -$587]*** **
Hospitalizations	**-26 [-38, -14]*** **
ED Visits	-5 [-20, 10]
30-day Readmissions	**-336 [-629, -43]***
ACS Hospitalizations	**-6 [-12, 0]***
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**-$5,419,635 [-$7,935,103; -$2,904,167]*** **
Hospitalizations	**-127 [-188, -66]*** **
ED Visits	-23 [-96, 50]
30-day Readmissions	**-251 [-469, -33]***
ACS Hospitalizations	**-31 [-62, 0]***

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. [§]Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. [§§]Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (1,473), with an average length of program enrollment of 11 quarters, ranging from 2-16 quarters.

[285] Adjustment factors include age, gender, race/ethnicity, extend of dual coverage, original coverage reason, indicators for chronic condition, and disability indicator.

[286] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Impact of BSLTOC Program in Each Quarter of Enrollment, AL/MC. Findings from a QFE DID model of impact are consistent with the average quarterly impact summarized above. Please see Appendix D for presentation of these findings.

Core and Supplemental Measures: End of Life Experience

Our community analysis compare the experiences of BSLTOC enrollees living in AL residences with those of a matched group of comparators. It considers the impact on utilization and cost of the BSLTOC program in the last 30 and 90 days of life.

Measures (per 1,000 beneficiaries)
- Total Cost of Care in Last 30 Days of Life
- Total Cost of Care in Last 90 Days of Life
- Hospitalizations in Last 30 Days of Life
- Hospitalizations in Last 90 Days of Life
- ED Visits in Last 30 Days of Life
- ED Visits in Last 90 Days of Life

Finder File and Creation of Analytic Sample. We use the same finder file BLSTOC provided for the AL analysis and included only participants who died after program enrollment. Our final analytic sample consists of 587 BSLTOC enrollees. We compare the experience of BSLTOC enrollees in the last 30 and 90 days of life.[287]

Comparison Group, End of Life Analysis. The comparison pool consists of beneficiaries who reside in AL residences in adjacent counties within the same metropolitan area as the counties where BLS's AL residences are located and who died after program enrollment. We use propensity matching to identify suitable comparators.[288] The final propensity score model includes age, race, gender, HCC score, and prior-year utilization (hospitalizations and ED visits) and cost. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[289]

Descriptive Characteristics, End of Life Analysis. Exhibit BSLTOC.8 displays the descriptive characteristics of beneficiaries in the treatment and comparison group.[290] There is no significant difference between BSLTOC and comparison beneficiaries on demographic characteristics, comorbidities, or prior utilization.

[287] See Appendix C for more about our analytic approach.

[288] For more information on propensity score matching, please refer to Appendix C.

[289] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[290] We test differences between these groups with a t-test for continuous measures (comorbidities and utilization before index hospitalization) or a chi-square test for categorical parameters (age, race, ethnicity, and coverage reason).

Exhibit BSLTOC.8: Descriptive Characteristics for BSLTOC and Comparison Group Beneficiaries, End of Life Analysis

Variable	Brookdale	Comparison
Number of Persons	587	587
Gender % (N)		
Female	67.0 (393)	66.3 (389)
Age Group % (N)		
<65 years	1.4 (8)	1.9 (11)
65-69 years	1.7 (10)	2.6 (15)
70-74 years	7.2 (42)	4.8 (28)
75-79 years	13.1 (77)	12.9 (76)
80-84 years	29.5 (173)	28.6 (168)
>=85 years	47.2 (277)	49.2 (289)
Race/Ethnicity % (N)		
White	98.3 (577)	98.5 (578)
Black	1.2 (7)	1.2 (7)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (SD)	3.2 (1.8)	3.2 (1.9)
Mean Count of HCCs (SD)	5.0 (3.3)	5.1 (3.3)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 Beneficiaries unless noted)		
Total Medicare Cost per Beneficiary (SD)	$41,670 ($34,274)	$43,508 ($36,118)
Hospitalizations (SD)	1,063 (1385)	1,107 (1244)
ED Visits (SD)	1,165 (1695)	1,153 (1623)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of BSLTOC Program, End-of-Life Analysis. Exhibit BSLTOC.9 assesses the adjusted impact of the BSLTOC program in the last 30 and 90 days of life, relative to the comparison group.[291] We find the following for the BSLTOC program, relative to the comparison group:

- **Cost:** A statistically significant decrease in total cost of care in the last 30 days of life (-$861 per beneficiary) and last 90 days of life (-$2,122 per beneficiary).
- **Utilization Measures:** Non-significant decreases in hospitalizations and ED visits in last 30 and 90 days of life.

Exhibit BSLTOC.9: Impact of BSLTOC Program on Outcomes, End-of-Life Analysis

AVERAGE IMPACT§	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care per Beneficiary in Last 30 Days of Life ($)	**-$861 [-$1,670; -$52]***
Total Cost of Care per Beneficiary in Last 90 Days of Life ($)	**-$2,122 [-$3,421; -$824]*****
Hospitalizations in Last 30 Days of Life	-25 [-67, 17]
Hospitalizations in Last 90 Days of Life	-22 [-63, 19]
ED Visits in Last 30 Days of Life	-2 [-35, 31]
ED Visits in Last 90 Days of Life	-2 [-41, 36]

[291] Adjustment factors include age, gender, race, HCC score, disability, ESRD, and prior-year utilization (hospitalizations and ED visits) and cost.

AVERAGE IMPACT§	
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care in Last 30 Days of Life ($)	**-$505,407 [-$980,290; -$30,524]***
Total Cost of Care in Last 90 Days of Life ($)	**-$1,245,614 [-$2,008,127; $483,688]*** **
Hospitalizations in Last 30 Days of Life	-15 [-39, 10]
Hospitalizations in Last 90 Days of Life	-12 [-37, 11]
ED Visits in Last 30 Days of Life	-1 [-20, 18]
ED Visits in Last 90 Days of Life	-1 [-24, 21]

Quality of Care (Qualitative Findings)

In addition to obtaining claims-based findings about quality, NORC's evaluation identifies the potential for improved patient safety through systematic use of INTERACT quality improvement protocols, and for BSL IL residents, improved participant satisfaction with communication and responsiveness of BSL staff in connection with the intervention. The HCIA-funded intervention was designed to become a smooth part of clinical operations and case management at BSL, while being invisible to enrollees in the SNF, AL/MC, and HH arms of the intervention. For this reason, NORC did not conduct focus groups or participant interviews with residents other than those enrolled in the IL arm, where participation in the HCIA-funded intervention was opt-in and involved a degree of engagement with residents and caregivers.

Patient Safety. As detailed in NORC's Second Annual Report to CMMI, the awardee uses INTERACT to make participant safety a systematic part of clinical and residential operating procedures, to "create a system of checklists, protocols, and algorithms to mitigate" the risk of errors (Site Visit Interview with Project Leadership, May 2015).

Beneficiary and Caregiver Satisfaction. While primary data are not available on the experiences of beneficiaries enrolled in the SNF, AL/MC, and HH arms of the intervention, focus groups with Independent Living (IL) residents find support for the modified version of INTERACT protocols implemented in that setting. Focus group respondents have priorities other than the INTERACT program (e.g., having nurses available more frequently during nights and weekends, having an alternative to calling 911 for any accident) but do see the INTERACT buddy program, where residents are paired to watch out for each other, as positive. Residents describe feeling more empowered to report unusual changes in a neighbor's health or functioning (after being prompted by a modified INTERACT Stop and Watch form), and a better connection with the community and management.

Workforce Development

Staffing. The BSLTOC is implemented across a BSL residence by non-clinical staff (BSL associates) with support and leadership by two dedicated staff roles: an RN clinical nurse leader, who serves as a program manager and trainer; and an RN transition coordinator embedded in selected high-referral hospitals, who facilitates communication between BSL and the hospital and acts as a BSL representative to the hospitalized resident. High turnover in the post-acute and home care sector, including BSL, makes maintaining staff a challenge. The clinical nurse leaders and transition coordinators were hired using HCIA funds. Initial plans to hire advanced practice nurses for the clinical nurse leader program were modified in the face of regional labor market shortages; instead BSLTOC recruits RNs with experience in

quality improvement and requires that they complete certified professional healthcare quality training. Staffing for the IL arm differs from other parts of the intervention; a licensed practical nurse (LPN) staffs each of the two wellness centers that NORC observed during our 2015 site visit. The LPNs deliver lunchtime programming derived from INTERACT tools such as Stop and Watch and the SBAR diagnostic.

Training. U North Texas trains the full range of non-licensed and licensed staff at BSL residences to use the INTERACT communications tools in SNF, AL/MC, and HH settings; across the implementation period, the awardee reports training 9,898 staff [from Q12 report or final report]. Non-clinical BSL Associates who have direct interactions with residents (e.g., housekeeping, dining services, transportation, maintenance) are trained to observe and report changes in residents' conditions, using the INTERACT Stop and Watch tool. BSLTOC shifted its training model mid-course, from an initial approach in 2013 consisting of an intensive one-week, on-site training of SNF, HH, and AL associates. Facility leadership were trained using an online portal supported by Loopback Analytics, for management and reporting as well as decision support, quality improvement, and ACP tools. In 2014, BSLTC launched a revised model consisting of a two-part training program. The first part is a shared session that convenes all regional partners, followed by an onsite training two or three weeks later to target specific tools and protocols. Future plans include a remote education and training program.

Implications for Workforce. INTERACT elevates the role of the nursing assistant in SNFs, and of personal care and ancillary staff in AL settings, by providing them with training and the documentation tool Stop and Watch. This tool allows staff to record and convey information to nursing staff about subtle changes in a patient's or resident's condition that may be clinically significant. Implementation of BSLTOC has been standardized and consistent across facilities, with specific and defined roles for staff. In terms of replicability and generalizability for staffing and training, this intervention would be easy to reproduce in other places.

Context: BSLTOC in its Third Year

Internal Context. As a national, for-profit corporation, BSL has tapped in-house resources to develop and spread the BSLTOC program. The merger with Emeritus broadened the size of BSL considerably and, at times, made it more difficult for the leadership team to keep the BSLTOC project as the highest priority; however, this did not stem or halt implementation.

> "The general pressure on hospitals today [is] to be concerned about readmissions. We just happened to be at the right place at the right time, in a sense… they are hearing from their leadership about the pressures and penalties so this is happening at the right time. It's an uphill climb but in some cases it would have been a lot steeper if it hadn't been for the fact that this is happening within the context of the changes in healthcare."
> –Project Leadership

External Context. A number of contextual factors external to BSL are seen as influential. These include the following: CMS penalties on readmissions; the variation from state to state in how AL and other non-medical residential facilities are regulated and licensed; the need for culture change among post-acute providers; the insistence by many family caregivers that BSL residents be transferred to the ED or readmitted, rather than managed at their residential facility; and the need to make a compelling business case, based on claims-based reporting, to motivate high-referral hospitals to participate. Much as hospital readmission penalties have been seen as influencing hospitals to become BSLTOC partners, the awardee expects that pending CMS policies regarding hospital readmission from SNFs will stimulate similar interest in BSLTOC. Beyond the SNF setting, however, BSL residences are not considered to be health care facilities and are therefore not covered entities under the Health Insurance Portability and Accountability Act (HIPAA). This means that the data exchanges at the core of BSLTOC may be difficult to establish, adding to challenges presented by differences in scope of practice and facility licensure for AL by state.

> "It's a complex set of issues. I think it's a major policy lesson we're learning. This is the largest scale data integration that's ever been done between SNF, AL, IL, and HH with a governmental mandate… When you start using that data with external parties, you open up a lot of privacy issues because we are trying to comingle AL and IL, which are not legally defined as healthcare entities. Therefore, there are no safe harbors under the HIPAA rule. With SNF, HH, hospital, and CMS data, which are clearly under HIPAA, the portability issues, what rights does a patient have to revoke authorization, do they need to give authorization…We're working around this inside the grant." –Project Leadership

Successful implementation involves making a case both clinically and from a business perspective. The awardee's leadership team describes that BSL's greater capacity to address symptoms at a residence has challenged expectations of both clinicians and family caregivers that residents will be transferred to a hospital. Experience over time may be necessary to build a sense of confidence that residence associates can effectively manage symptoms that might otherwise result in an ED visit. For hospitals who might consider partnership with BSL around the intervention, the awardee's ability to provide aggregate reporting based on CMS claims has been instrumental in convincing hospitals to collaborate in implementing the BSLTOC program.

Sustaining, Replicating, and Spreading Innovation

Sustainability. As noted in NORC's Second Annual Report, BSL plans to sustain the full BSLTOC innovation at its participating SNF facilities and to continue implementing a modified version of BSLTOC at the AL/MC and HH sites. The wellness programs featured at IL sites under the grant will be continued, but not under the banner of BSLTOC. The awardee did not receive a NCE, so BSL has supported ongoing operations. While BSL will have the benefit of access to the broad technology infrastructure created with HCIA funding to deliver ongoing measurement and evaluation of BSLOC's impact, the awardee will no longer have access to Medicare claims data that had been purchased under the CMMI grant. As a result, BSL's ability to document and report impacts will be more limited.

> "We see a moral obligation to share what we're learning, not only with our other communities, but with other providers. I think we've learned a lot about what happens in the post-acute long term care field, how to build effective collaborations to reduce and mitigate the risk for avoidable readmissions and ED transfers…One of the things we clearly know is that although we are the largest in the US, we may not be the largest in a particular market. None of us can be everything to everybody. So how do we work with another provider that may complement our gaps and use the term 'co-op-petition,' collaboration plus competition." –Project Leadership

Replicability and Scaling. In addition to sustaining BSLTOC at existing residences, BSL plans to expand the innovation to all 74 BSL SNF residences around the country, with protocols integrated into the PointClickCare EHR, and to scale a modified version of BSLTOC to the corporation's AL/MC residences and HH programs. The IT platform created by Loopback Analytics under HCIA funding is seen as offering a competitive advantage for marking post-acute transition of care services and quality improvement to hospitals. As hospitals become more committed to reducing readmissions, prospects improve for scaling.

> "One of the things I'm seeing more and more is that the acute care providers are starting to look beyond just that high risk group that is going to skilled nursing and home health. We are starting to look at the rising risk population, going beyond the 5% to look at the 15-20% that are in assisted living or maybe living with dementia at home, who are also high risk for hospitalizations and ER transfers, looking at ways we can come together to help with geriatric population heath management piece." –Project Leadership

For a hospital that is part of a Medicare accountable care organization, discharge to AL may appear to be more cost-effective than discharge to SNF; however, BSLTOC leadership is attempting to make the case that discharge to SNF could be more likely to reduce hospital readmissions. 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. University of Texas Health Science Center (UNTHSC) also conducted a pilot study of the INTERACT AL and HH tools in non-BSL facilities to ensure their usability. The four-month pilot was run in non-BSL markets and involved 30 AL providers and 14 HH agencies that provide their feedback and assessments of the paper-based tools. Although respondents did mention suggestions for improvement, both sets of tools were overall positively received and deemed useful by the majority of respondents.

Organizations like BSL have extensive internal management and capital resources to operate complex interventions in changing, uncertain, or provisional financing environments such as those existing under Medicaid and short-term federal funding. This gives them a great advantage in sustaining or scaling their HCIA initiatives.

Summary

Our claims-based analyses of the BSLTOC program for SNF residents finds there are significant decreases in 30-day total cost of care. In addition, there is a significant decrease in hospitalizations, ACS hospitalizations, readmissions, and total cost of care for AL residents, relative to the comparison group. Finally, we observe significant reductions in cost outcomes for AL residents in the last 30 and 90 days of life.

Our analysis of the BSLTOC SNF program is limited to those BSL SNFs with adequate sample size. For BSL SNFs with inadequate sample size, we did not identify comparison facilities or include comparison episodes; as a result, this analysis may not be representative of trends in the larger BSLTOC SNF population. Additionally, for the BSLTOC AL analysis, we are only able to identify comparison group AL residents if they have an AL place of service claim, which may bias results as AL residents in the treatment group may not have POS claims.

The awardee and its main implementation partner, BSL, have successfully integrated INTERACT into selected SNF residences in multiple locations, as well as modified versions of INTERACT at selected AL/MC residences and HH programs. Developing data-sharing relationships with high-referral hospitals that serve BSL residents has been a critical part of the intervention model, to ensure warm handoffs at transition to and from the hospital, and to use claims data to build a business case for the BSLTOC; these relationships must be sustained to ensure future success for the model.

BSL's existing corporate structure and the standardization of operating protocols, staffing, and training across residences nationally frame the implementation process and help situate the intervention for successful continuation, replication, and scaling within BSL. There are multiple levels of leadership, from local to national, including a chief medical officer, involved in the implementation and who are already committed to systematic quality improvement. The INTERACT suite of tools facilitates creation of a paper trail to document transitions of care, supplementing a resident's records at BSL, enabling a focus on quality improvement around transitions, and strengthening communication with partner hospitals. BSL's internal budgetary resources were tapped to supplement some parts of the grant programs, improving the prospects for sustaining and scaling BSLTOC.

References

HCIA Narrative Progress Report for University of North Texas, for Reporting Quarter End Date 6/30/2015. Submitted by U North Texas, 7/31/2015.

HCIA Quarterly Report for U North Texas, for Reporting Quarter End Date 6/30/2015. Submitted by U North Texas, 8/31/2015.

HCIA Final Performance Progress Report. Submitted by U North Texas, 9/28/15.

University of Rhode Island

Living RIte Centers. Two sites hosted by state developmental disabilities agencies offer integrated care delivery in clinic, community, and home settings for adults living with intellectual and developmental disability (I/DD). Centers partnered with existing developmental disability organizations to integrate an accessible, ambulatory care clinic with employment, social service, behavioral health resources, and wellness classes.

PROGRAM MODELS: Beneficiary/Caregiver Engagement, Care/Case Coordination, Disability Medical Home, Independent Living Skills, Patient Navigation

LOCATION: Kingston, RI
GRANT: $10,202,795
AWARD DATES: 11/27/12 to 6/30/15
NO-COST EXTENSION: 90-day orderly close out
PAYER(S): Medicare, Medicaid

REACH: 347 beneficiaries (100% of target)
POPULATIONS: Disability, Urban, Dually Eligible
DATA: Medicare claims (1/13-6/15); site visits (2014, 2015); telephone interviews with leadership (2015, 2016)

IMPLEMENTATION

- Program leveraged existing developmental disability organizations in community for space, staff recruitment, and community outreach.
- Awardee's internal assessment identified functional differences between the two sites in communication and teamwork.

WORKFORCE

- Each center used interdisciplinary team to integrate services.
- Lay health worker positions, including life coaches and peer mentors, addressed goals for health and independent living.

CONTEXT

- Competing state level policy issues, such as mandate to close sheltered workshops, decreased partner engagement through competing priorities.
- Multiple local interventions targeting the same participants caused confusion among potential enrollees.

OUTCOMES§

COST

- Increase in total quarterly cost of care ($2,360 per beneficiary)

UTILIZATION

- No findings reach statistical significance.

QUALITY

- Participants benefit from health promotion aspect of wellness classes

Analysis limited due to small sample size, short performance period relative to complexity of beneficiary needs, and lack of Medicaid claims data.

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

Living RIte considered sustainability options, including a bundled payment under the Rhode Island State Innovation Model (SIM) grant. It also prepared bundles for care coordination services, interdisciplinary team services, nurse practitioner assessments, coaching, education, and employment services.

REPLICABILITY & SCALING

Awardee leaders have not shared plans to replicate or scale this intervention.

§Outcomes for cost and utilization are from analyses that include a comparison group and are statistically significant at the P<0.10 level. Quality of care outcomes also include focus group findings.

Overview of the Living RIte Program

Background. The Living RIte Center offers clinic-, home-, and community-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). The University of Rhode Island (URI) manages the staffing, outreach, and general program management aspects of the intervention, while state-suported developmental disability organizations (DDO) Seven Hills and AccessPoint RI manage the on-site clinical implementation. The program launched in May 1, 2013.

Goals. Although the awardee shares CMMI's interest in reducing hospital admissions and providing high-value care, the focus in this innovation is on creating a new type of integrated care delivery that speaks to the specific needs of persons living with I/DD, including access to education, employment counseling, transportation, and other community benefits and supports. Within the intervention period, the program redefines these goals to include the motto "to take the service where the client is," including recreation, socialization, and home-care.[292] Priority populations within the target group include persons with limited English proficiency (preferred language of Spanish), urban dwellers, and those living with a disabling condition.

Program Model and Practices. The Living RIte Center model is intended to provide health care, well-being services, and employment services, embedded into existing and culturally familiar community organizations. The program works with beneficiaries to provide disease education and disease management to improve overall health and employment status. The awardee feels that the most significant pieces of the intervention are the placement of holistic interdisciplinary teams to address healthcare, well being, and employment within an existing developmental disability provider organization. Including accessible examination rooms, such as tables, scales, and telemedicine equipment, creates a more inclusive environment.

Implementation Updates. During the award close out period, the awardee developed care plans for Living RIte Center participants to assist in continuity of care post-intervention. In doing so, the awardee reflected on the challenges facing the project.

- **Enrollment.** Many factors constrained enrollment, such as knowledge and understanding of the program, confusion among the larger marketplace options, and gatekeepers or caretakers who declined on behalf of an individual. The awardee received permission to include Medicare Fee-For-Service (FFS) Alzheimer's/dementia patients but was never able to enroll this population into the program, due to changes in contracting authorities. It also reduced the number of chronic illnesses needed for enrollment from two to one; as a result, the population it served was healthier than expected. The eventual relationship with Neighborhood Health Plan did not provide the level of referrals originally expected by the program, especially because many referrals from this source were already enrolled, ineligible, or uninterested; the conversion rate from referral to enrollee did not reach 35 percent, according to the awardee's own data.
- **Interdisciplinary Team Meetings.** The awardee used a six sigma approach for analyzing interdisciplinary team meetings (IDTs) at the two center locations. The awardee found that at the

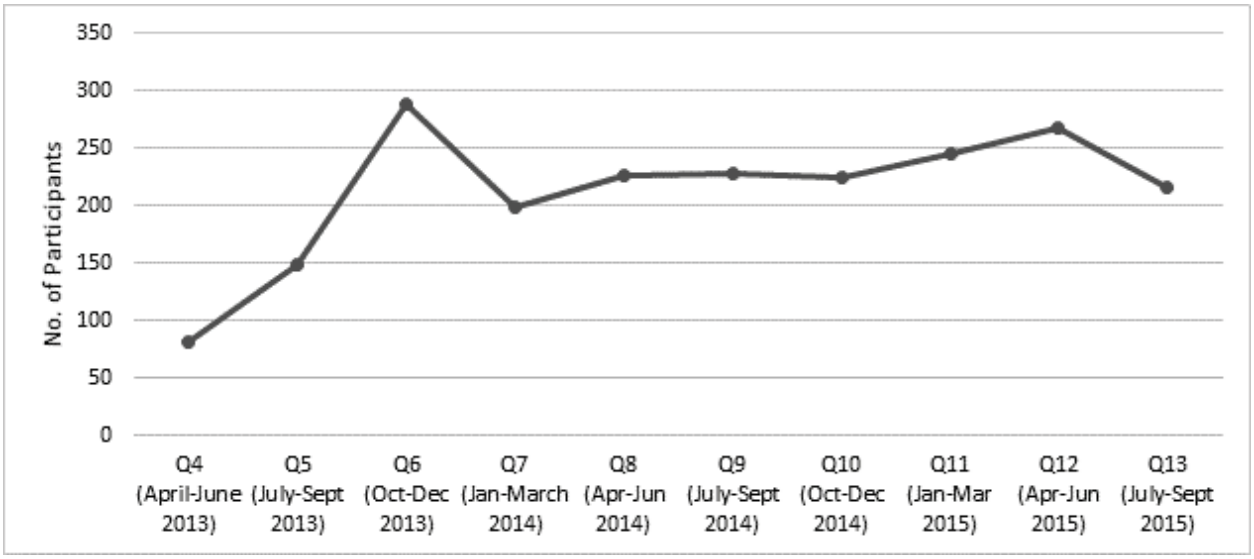
[292] *HCIA Narrative Progress Report for University of Rhode Island* for Reporting Quarter End Date 6/30/2015. Submitted by URI, 7/31/2015.

Seven Hills center there was a lack of interdisciplinary communication between the staff types. Additionally, the awardee identified redundancies, such as multiple employees of the same position seeing the same client in follow-up appointments. The awardee identified a lack of progress and follow-up from the IDT process, based in inefficient communication. In contrast, the awardee reported highly efficient communication and teamwork in the AccessPoint RI Center, where meetings included clear action items identified with the correspondingly responsible staff member.

- **Fidelity to the Model.** The two Living RIte Centers had different cultures and services in their host organizations. For example, some key components such as an interdisciplinary team meeting or employment services differed based on the atmosphere of each developmental disability organization. Each center seemed satisfied with the manner in which they operated, and the program goals remained parallel between them. At closeout of the intervention, the awardee reported that the two centers disagreed on the success of and need for the lay health worker positions. One of the center directors stated that the culture of her center was not a good fit for the peer specialist role, stating that other direct staff within the agency felt that their positions were being encroached upon. The other center director did not experience these staffing culture clashes, although the awardee noted that the life coach was underutilized because of delays in the employment focus of the intervention, which was a primary responsibility of the life coach staff.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 31, 2015, URI had served a cumulative total of 347 unique participants since program launch. Enrollment rose rapidly through Q6 (December 31, 2013), then fell and leveled off for the remainder of the intervention (see Exhibit RIte.1). During the most recent quarter for which data are available, the program served 216 participants. 51 percent of participants were female. 81 percent of participants are between the ages of 26 and 64, with an additional 13 percent of participants between ages 65 to 74 and 5 percent between ages 19 and 25. 79 percent of participants were White, with an additional 2 percent identifying as Black or African American. 19 percent of participants were of unknown race or ethnicity.

Exhibit RIte.1: Total Number of Living RIte Enrollees, by HCIA Reporting Quarter



Summative Findings (Outcomes)

We observe no significant differences in utilization for Living RIte; however, we observe significant decreases in hospitalizations in the last two quarters, and declines in emergency department (ED) visits that almost reach significance in the last three quarters. Overall, costs for Living RIte participants are higher than the comparison group.

In the section below, we present our analyses of program effectiveness, based on two types of data: Medicare FFS claims and narrative from NORC interviews and site visits.

Core and Supplemental Measures

Our community (ambulatory care) analysis compares the experience of Living RIte enrollees with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the Living RIte innovation over the enrollment period as a whole and in each quarter of enrollment. Our analysis is for dually eligible beneficiaries, comprising all Living RIte enrollees.[293]

Measures (per 1,000 beneficiaries unless noted)
- Total Quarterly Cost of Care per beneficiary
- All-cause Hospitalizations
- ED Visits
- Ambulatory Care-Sensitive (ACS) Hospitalizations

Finder File and Creation of Analytic Sample.
URI provided a finder file of program participants and their enrollment dates, enabling us to use Medicare claims for these beneficiaries to calculate outcome measures.[294] We identified 305 unique individuals, yielding an analytic sample of 305 beneficiaries.

Comparison Group. The comparison pool consists of Medicare FFS patients with similar intellectual and developmental disabilities in Rhode Island and Connecticut. We use propensity score matching to find suitable comparators.[295] The final propensity score model includes age, race, gender, disability status, Chronic Illness and Disability Payment System (CDPS) risk score, flags for psychiatric conditions, and prior-year utilization (hospitalization, ED visits, and cost). We match *with replacement*, where more than one comparison beneficiary can be matched to a Living RIte beneficiary. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score matching improves comparability.[296]

Descriptive Characteristics. Exhibit RIte.2 displays the descriptive characteristics of beneficiaries for the treatment and comparison groups, with respect to demographics, comorbidities, and prior

[293] Estimated percentage of Medicare FFS participation comes from awardee self-reported data. See Appendix C for more information about our analysis.

[294] Medicare claims are available through March 31, 2016, for the analysis in this report. We use December 31, 2015, as the cut-off date to account for the 90-day claims runoff.

[295] For more information on propensity score matching, please refer to Appendix C.

[296] For more detailed information on propensity score matching, please refer to Appendix C; for tests of common support and covariate balance, see Appendix D. We prioritize matching on health status and prior-year cost and use; as such, we do not find complete matching on age and race, but we adjust for these characteristics in the regression models.

utilization.[297] Even after matching, there remains a small but significant difference in prior-year health utilization and cost.

Exhibit RIte.2: Descriptive Characteristics for Living RIte and Comparison Group Beneficiaries

Variable	Living RIte	Comparison
Number of Beneficiaries	305	229
Gender % (N)		
Female	50.5 (154)	52.4 (120)
Age % (N)		
18-29 years	8.5 (26)	7.4 (17)
30-40 years	19.0 (58)	17.9 (41)
41-54 years	35.4 (108)	30.1 (69)
55-69 years	29.5 (90)	34.5 (79)
70+ years	7.5 (23)	10.0 (23)
Race/ethnicity % (N)* **		
White	92.8 (283)	72.5 (166)
Dual Eligibility % (N)* **		
Dually Eligible	77.4 (236)	60.3 (138)
Chronic Illness and Disability Payment System (CDPS) Psychiatric Indicators		
CDPS Psych (medium)	13.1 (40)	11.4 (26)
CDPS Psych (low)	10.5 (32)	9.6 (22)
Chronic Conditions % (N)		
Mean CDPS Acute Risk Score (Standard Deviation)	2.3 (1.4)	2.4 (1.6)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 beneficiaries unless noted)		
Total Medicare Cost per beneficiary (SD; $)**	$65,771 ($47,908)	$55,608 ($49,665)
All-cause Hospitalization (SD)***	200 (516)	258 (577)
ED Visits (SD)***	646 (921)	734 (966)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of the Living RIte Program. Exhibit RIte.3 displays the average quarterly and aggregate impact of the RIte program on its participants relative to the comparison group.[298] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[299] We find the following impacts of the Living RIte program, relative to the comparison group:

- **Cost:** A significant increase in total quarterly cost of care ($2,360 per beneficiary).[300]
- **Utilization Measures:** Non-significant increases in hospitalizations, ED visits, and ACS hospitalizations.

[297] We test differences between these groups with a t-test for continuous measures (risk score and prior utilization) or a chi-square test for categorical parameters (gender, age, race, dual eligibility, and group home residency).

[298] Adjustment factors include age, gender, race/ethnicity, dual eligibility indicator, JEN Frailty score, and a disability indicator.

[299] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization, and report those results where relevant.

[300] This likely reflects the relatively greater costs than those observed for the comparison group in the first seven quarters after enrollment, which is in contrast to lower costs in the final three quarters of observations, as shown in the QFE charts below.

Exhibit RIte.3: Impact of the Living RIte Program on Outcomes

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 Beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care per beneficiary ($)	**$2,360 [$566; $4,154]****
Hospitalizations	2 [-17,21]
ED Visits	2 [-26, 30]
ACS Hospitalizations	6 [-7, 19]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	**$6,136,229 [$1,471,258; $10,801,200]****
Hospitalizations	4 [-45, 53]
ED Visits	5 [-67, 77]
ACS Hospitalizations	13 [-16, 42]

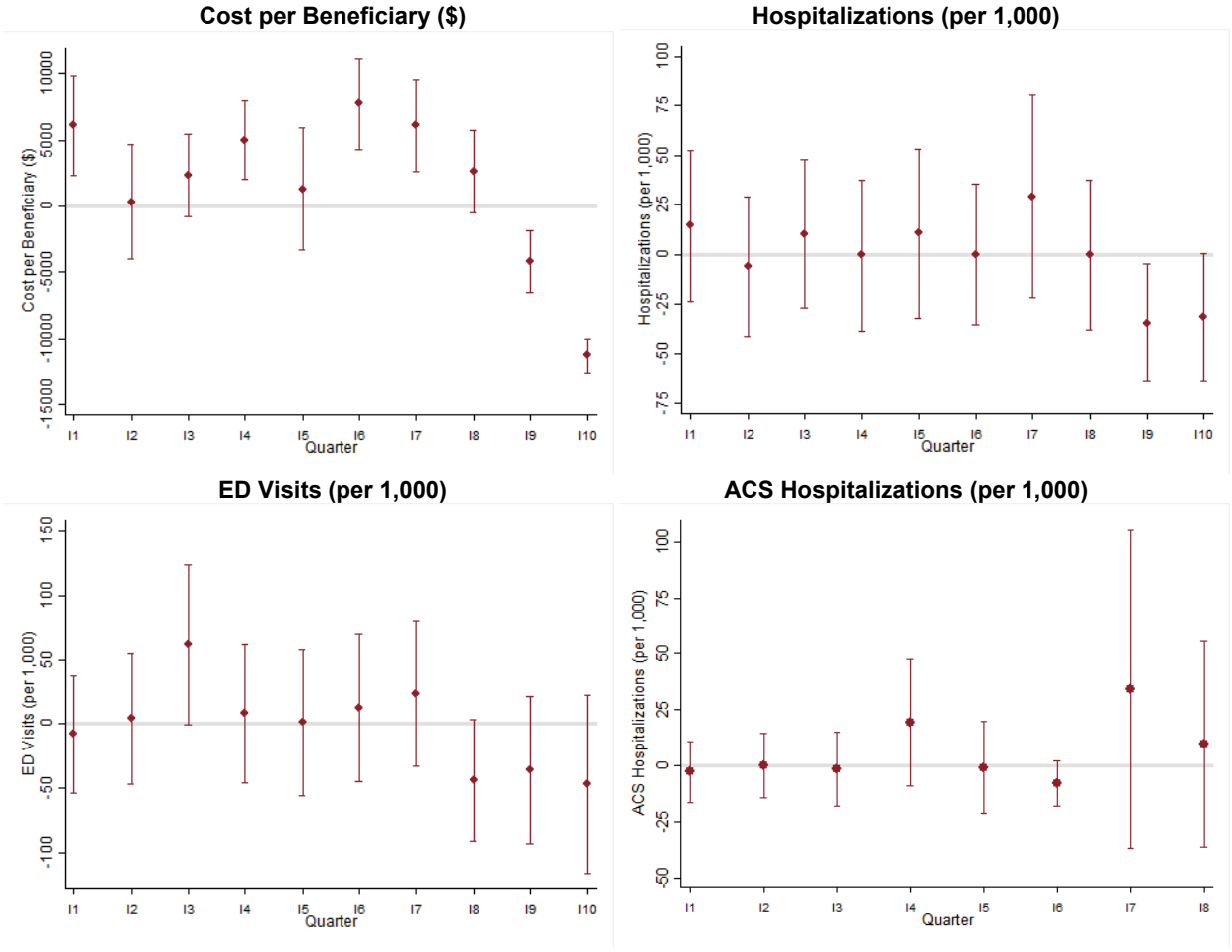
NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates findings that reach statistical significance. §Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program enrollment. §§Aggregate Impact is the total difference-in-differences estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (305), with an average length of program enrollment included in analysis of 10 quarters.

Impact of the Living RIte program in Each Quarter of Enrollment. Exhibit RIte.4 displays the results of quarterly fixed effects (QFE) DID models that assess the adjusted marginal effect of the Living RIte innovation on hospitalizations and ED visits.[301] We find the following for the Living RIte program, relative to the comparison group:

- **Cost:** We observe no consistent pattern in the first seven quarters of program enrollment. This is followed by a decreasing trend during the most recent post-enrollment quarters, reaching statistical significance in quarters nine and ten.
- **Utilization Measures:** We find no pattern in the first eight quarters of post-enrollment, but we do observe statistically significant decreases in hospitalizations in the last two post-intervention quarters. There are no significant differences in ED visits in any of the post intervention quarters, although there is a large and unexplainable increase in the third quarter but a decreasing trend in ED visits in the last three quarters. We also find no significant differences in ACS visits in any of the post intervention quarters. The large confidence intervals in the later quarters are due to small sample sizes.
- **Quality of Care:** No clear trend, due in part to the small number of episodes.

[301] The effect is displayed as the average difference between treatment and comparison per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I10) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. For a more detailed explanation of the DID models and measure specification, please refer to Appendix C.

Exhibit RIte.4: Impact of the Living RIte Program on Outcomes, by Quarter



Quality of Care (Qualitative Findings)

NORC's findings are based on one site visit, review of program documents, and interviews with program staff.

Patient Safety. The program conducted medication profile reviews for participants who used the program-associated pharmacy. Between July 2014 and March 2015, the awardee documented 239 medication reviews in self-reported data. The pharmacist flagged issues including duplication, above-range dosages, and recommendations for laboratory blood panel monitoring. The pharmacist conducted reviews prior to the interdisciplinary team meeting. As a high-touch intervention, the awardee collected data on the average number of services per enrollee to reflect the intensity of the intervention. During quarter 12 of implementation, each enrollee had an average of 15.40 services. The awardee also monitored pharmacy reconciliation within 14 days of enrollment; the centers met this goal for close to half of new enrollees. The program required participants to use a preferred pharmacy in order to work with the Living RIte Center pharmacist, which lowered the success of this measurement.

Beneficiary Experience. Based on qualitative focus group and interview data, participants in the Living RIte Center are very pleased with their experiences. Participants speak highly of the home-based services, noting their convenience and timely delivery. The ability to connect with a variety of specialists, especially physical therapy and dietetics, is another highlight among participants. Of those who participate in the activity classes, participants feel that courses are both physically and intellectually accessible, making them an enjoyable experience.

Workforce Development

Staffing. The awardee's self-reported data notes a range of staff and volunteers, including three nurse practitioners, three occupational therapists, and six peer specialists (e.g., life coach, counselors, job coach or employment specialist, family mentor, outreach enrollment coordinator). These staff are divided between two Living RIte centers—one in Cranston (AccessPoint) and one in Woonsocket (Seven Hills). Roles for staff and volunteers include primary care delivery, care coordination, patient engagement, and counseling. A dietician, physical therapist, and speech language pathologist also provide services. Interdisciplinary teams are convened on behalf of each participant, with team members including nurse care coordinators, clinical pharmacists, physicians, and for some enrollees, family members or guardians. Implementation experience involved addressing a number of challenges, including staff recruitment and retention; as a result, the intervention was consistently understaffed.

At end of the intervention, one program leader stated that the life coaches should have had different hiring and training criteria. During the intervention, the hiring criteria was a bachelor's degree and a disability, but this program leader felt that certification as a life coach and a standardized education would have been more beneficial. The life coach role aimed to provide peer support and guidance to participants in various situations. It is possible that a certification would have prepared life coaches to adapt to the different needs of each participant more fluidly, but it could also have created a bigger hiring cost. The life coach role was originally designed as a quintessential lay health worker position that would not provide clinical or social work expertise.

Training. Training programs for staff include a 90-hour peer specialist course offered by Stepping Up, a nonprofit health careers training program that partners with hospitals and community nonprofits to train entry-level workers, and the Community College of Rhode Island. A total of 30 trainees completed a total of 2,382 hours of training. The awardee projected 24 trainees during the award and was able to exceed this projection.

The awardee assisted 35 people in obtaining competitive employment, which surpassed their original projection of 31. This component experienced postponements due to general hiring delays within the program, which meant that employment specialists were not on-boarded until the final months of the program.

Context: URI in its Third Year

External. During this project, the state of Rhode Island was involved in various health care initiatives, including the Integrated Care Initiative in project, which enrolled I/DD dual eligible clients of Rhode Island in 2014. The enrollment caused confusion among state stakeholders, clients, and caregivers, and caused enrollment problems for Living RIte, as many providers, caregivers or participants opted to avoid additional new programs.

In the beginning of the intervention, the U.S. Department of Justice issued an employment decree declaring that sheltered workshops would be eliminated in the Rhode Island by 2024. DD agencies in the state were overwhelmed by this prospect and many resources were diverted to handle this change.

Internal. The program experienced various internal capacity and staffing conflicts during the intervention. Working within a university made hiring and budgeting more difficult, which created particular challenges given HCIA's rapid-cycle and rapid-response nature. The program also struggled with internal inconsistencies in terms of leadership styles and communication, in part because of the various organizing bodies involved with leading the different arms of the program.

Sustaining the Living Rite Centers

Sustainability. The award will not be continuing in its current state. The project brought on a consultant for sustainability funding options, but the Director of the Rhode Island Department of Behavioral Health and Developmental Disabilities and Hospitals did not approve the proposals. The awardee had considered various other sustainability options, including a bundled payment mechanism under the State Innovation Models (SIM) grant and incorporating new providers into Medicaid programs. The awardee prepared bundles for care coordination services, interdisciplinary team services, nurse practitioner assessments, coaching, education, and employment services.

The awardee was unable to secure support from these organizations.

Both parent corporations housing the centers are committed to find funding for this model of care, although how or from where this funding will be secured is unclear. Seven Hills is conducting a comprehensive primary care pilot, limited to 40 participants, to determine the financial feasibility of the model. AccessPoint RI is continuing to explore funding options for the Living RIte model, including a mechanism to provide peer specialist services, based on the positive feedback from its clients on this position.

The Living RIte Centers have a case management contract with the Neighborhood Health Plan for Integrated Care Initiative clients. This contract covers a small amount of the services from the larger grant—primarily enrollment, assessment, and management of high-risk clients. NHP has since hired the director of the Seven Hills Living Rice Center to lead the long-term care services and supports under the dual initiative.

Replicability. The Living RIte Centers are not replicating at the time of this report.

Summary

Our claims-based analysis of the Living RIte program shows non-significant increases in hospitalizations, ACS hospitalizations, and ED visits, but a statistically significant increase in total cost of care for Medicare FFS beneficiaries. 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, especially in quarters nine and ten. Living RIte program participants represent a high-risk group and it has been challenging to identify suitable comparators for the program.

The aggregate analysis using a comparison group shows no significant impact on use and higher costs relative to the implementation group, although the quarterly effects estimates suggest that the program might reduce costs in later quarters of enrollment. With the inclusion of additional adjustment factors of specific CDPS conditions, we may have improved the comparison sample, but longer evaluation time would be needed to see continued improvement. The awardee anticipated higher cost reductions due to a state policy to increase shared living opportunities, which did not have the expected result in the target population and many participants remained in group homes.

The awardee implemented an ambitious program with limited success. Plans relied heavily on cooperation and buy-in from area stakeholders—such as state agencies, payers, residential facilities, and upcoming policy changes—to reduce overall costs. The awardee showed an inability to adapt to the external and internal changes in this context, and as such, saw fewer returns for its program. At the same time, the program has created innovative capabilities in the DDO partners, providing future possibilities for integrated and holistic care. Enrolled beneficiaries expressed satisfaction with clinical services and staff spoke to the need for and value of the Living RIte model.

References

HCIA Narrative Progress Report for University of Rhode Island for Reporting Quarter End Date 6/30/2015. Submitted by URI, 7/31/2015.

HCIA Quarterly Report for University of Rhode Island, for Reporting Quarter End Date 6/30/2015. Submitted by URI 7/31/2015.

University of Texas Health Science Center at Houston

High-Risk Children's Clinic (HRCC). HRCC provides dedicated outpatient services (primary, specialty, post-acute, chronic disease management) and around-the-clock phone access for extremely fragile, medically complex children enrolled in Medicaid. The clinic serves as a comprehensive medical home where both primary and specialty services are provided at the same visit, as well as family caregiver education, social services referrals and assistance with durable medical equipment, and home visits to assess housing conditions.

PROGRAM MODELS: Care/Case Coordination, Caregiver Education and Support, Integrated Care Delivery, Patient Navigation

LOCATION: Houston, TX

GRANT: $3,701,370

AWARD DATES: 9/11/12 to 6/30/16
NO-COST EXTENSION: 12 month, full program
PAYER(S): Medicaid

REACH: 317 beneficiaries (103% of target)
POPULATIONS: Children, Disability, Racial/Ethnic Minority
DATA: Medicaid claims (1/13-6/15); one site visit (5/14); telephone interviews with leadership (2014-2016)

IMPLEMENTATION

- Patient population has grown and staff such as a nutritionist and pediatric surgeon has been added to the HRCC team.
- New enrollees were recruited from those who had previously been assigned to usual care in the randomized control trial running in conjunction with HCIA support

WORKFORCE

- Small, dedicated, multi-lingual team of nurses, social worker, physicians and specialists (e.g. pulmonologist, gastroenterologist, and neurologist).
- Informal training based on shadowing and team meetings.

CONTEXT

- HRCC staff work long and emotionally stressful hours; the program has diligently hired the right staff.

OUTCOMES§

COST

- Reduction in Phase 1 total clinic and hospital quarterly cost of care (-$1,790 per beneficiary)
- Reduction in Phase 2 total clinic and hospital quarterly cost of care (-$3,649 per beneficiary)

UTILIZATION

- Decrease in Phase 1 hospitalizations per quarter (-36 per 1,000 beneficiaries) and emergency department visits per quarter (-83 per 1,000 beneficiaries)

Analysis limited due to small sample size. Stratified enrollment: Phase 1 (9/12 to 9/13, during randomized clinical trial) and Phase 2 (since 9/13).

SUSTAINABILITY, REPLICABILITY, & SCALING

SUSTAINABILITY

In collaboration with the Texas Medicaid MCO Amerigroup, Community Health Choice and United Healthcare, HRCC has received support through August 2017 from federally matched funds provided by the Texas Network Access Improvement Program (NAIP), and will seek funding for 2018 as well. UT Houston staff also received a award through the National Institutes of Health to support staff in the HRCC. UT Houston continues to seek a direct capitation rate from Texas Health and Human Services, and the Medicaid HMO plans.

REPLICABILITY & SCALING

Awardee has not shared plans to replicate or scale the intervention.

§Outcomes for cost and utilization are from analyses that include a comparison group and are statistically significant at the p<0.10 level.

Overview of the High-Risk Children's Clinic

Background. The principal investigator for this award is an experienced neonatal and pediatric researcher and clinician specializing in care for high-risk, chronically ill children. Prior to his work in Houston, he developed a similar clinic intervention for high-risk neonates at the University of Texas Southwestern Medical Center in Dallas. The High-Risk Children's Clinic (HRCC) launched in Houston in March 2011. It initially received support from the Texas Department of Health and Human Services (HHS) as a randomized controlled trial (RCT) to demonstrate the cost savings and improved health outcomes between comprehensive care and the usual care provided by other faculty-supervised clinics or private offices. The HCIA award began mid-2012, and the RCT design of the intervention continued until September 2013, when preliminary results showed that outcomes for the continuing care intervention relative to the control group intervention had met pre-set criteria to stop random assignment and open the comprehensive clinic to the control patients originally assigned to usual care.

UT Houston implemented the HRCC program in partnership with the Memorial Hermann Hospital system. HRCC offers comprehensive outpatient care as a medical home model for extremely fragile and complex chronically ill children, the great majority of whom are enrolled in Medicaid. Many HRCC participants depend on technology, such as feeding tubes or ventilators. Parents are encouraged to call ahead for same-day visits for acute problems, Monday through Friday, but even children arriving without notice before 5 p.m. are seen that day. Children with acute care needs on weekends or nights are seen the next weekday. If an emergency department (ED) visit or hospitalization is needed, HRCC staff discusses the child's visit with the responsible emergency physician and schedules a prompt follow-up visit with the child. The HRCC intervention educates and involves parents, home health nurses, and other caregivers on the care team to ensure information is communicated and issues are treated promptly.

Goals. Although the awardee shares CMMI's interest in reducing hospitalizations and providing high-value care, the HRCC also aims to improve the health of children and adolescents by reducing premature deaths, admissions to the Pediatric Intensive Care Unit (PICU), incidences of serious illness, and lengths of hospital stays.

Program Models and Practices. The HRCC program is a medical home model that provides intensive, full-service outpatient primary and specialty care seven days a week.

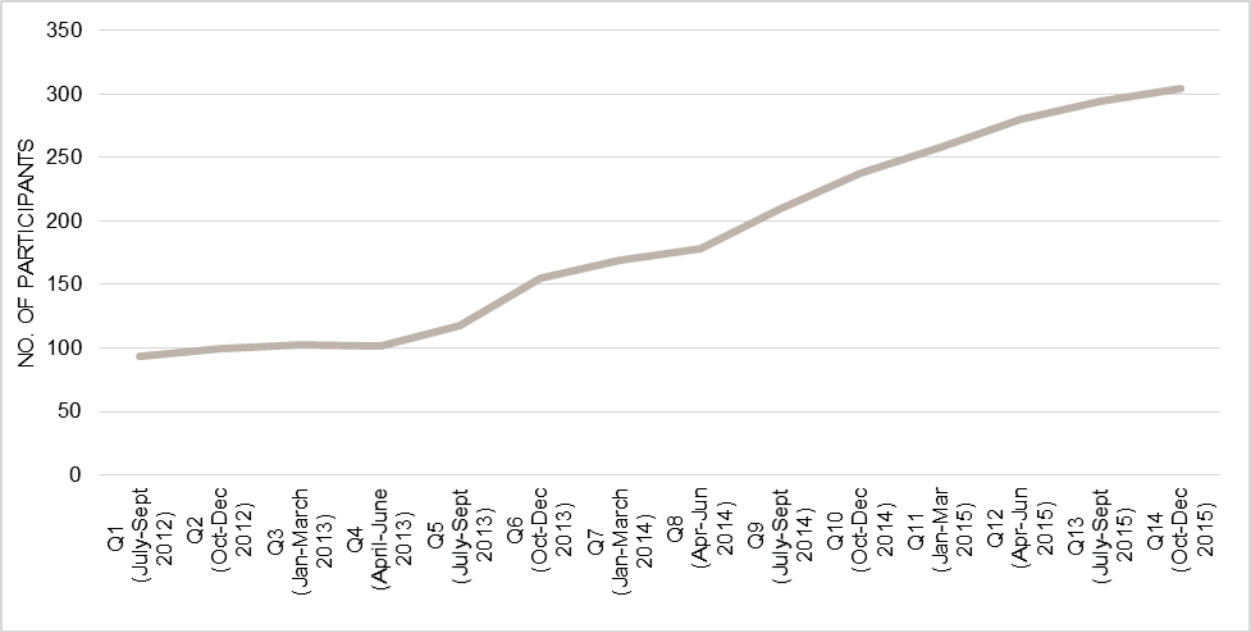
Implementation Updates. Since NORC's Second Annual Report (September 2016), HRCC has added specialists such as a nutritionist, pediatric surgeon, pediatric cardiologist, and hematologist. The program has continued recruiting high-risk children for the intervention by contacting those children who were originally randomized to usual care to join the HRCC program, placing brochures at Memorial Hermann Hospital and local pediatric specialty clinics, and assessing claims data to identify children admitted to Memorial Hermann Hospital or seen at the emergency department.

Reach and Demographic Profile of Enrolled Beneficiaries. As of December 30, 2015, HRCC had served a cumulative total of 317 unique direct participants since program launch. Since the RCT ended in September 2013, enrollment has gradually increased (see Exhibit HRCC.1).[302] During the most recent

[302] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent HRCC self-reported data available for NORC's AR3 is for HCIA reporting quarter 14, for the time period October 1 through December 31, 2015.

quarter for which data are available (October 1 through December 31, 2015), the program served 305 unique participants. Just over three-quarters of the participants are between 1 and 11 years old (78 percent) and 15 percent are 12 to 18 years old. Sixty one percent are male. Intervention participants largely identify as Hispanic (44 percent) or Black or African American (40 percent).

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



Summative Findings (Outcomes)

The HRCC reduces health care utilization and the cost of care for Medicaid beneficiaries.

In the section below, we present our analyses of program effectiveness, based on two types of data: claims (Medicaid), and narrative from NORC interviews and a site visit.

Core and Supplemental Measures

Measures (per 1,000 beneficiaries unless noted)
- Total Cost of Care per beneficiary
- Total Clinic and Hospital Cost of Care§
- All-cause Hospitalizations
- ED Visits

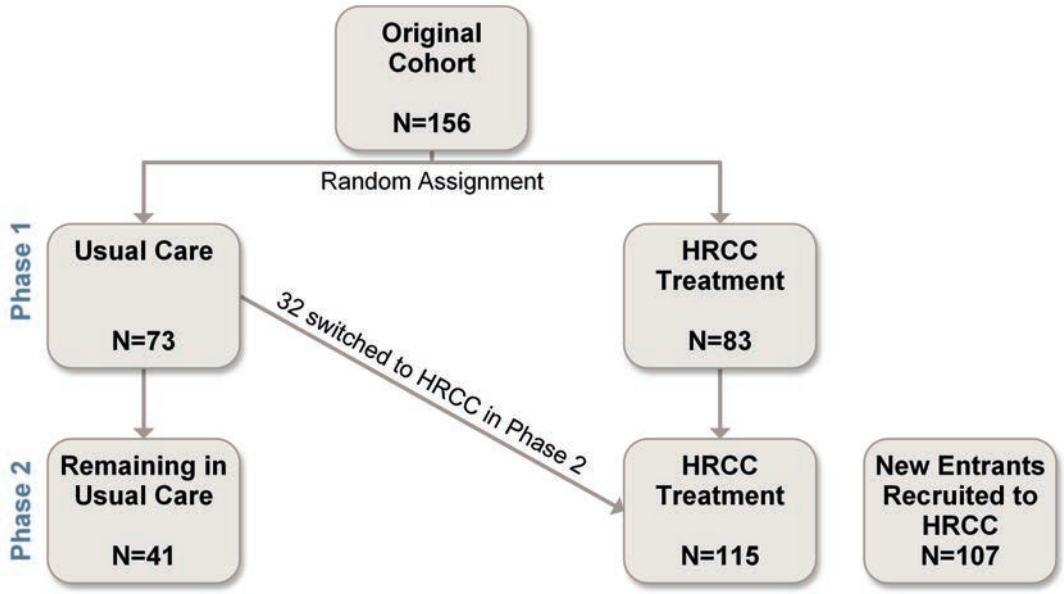
§Cost is limited to clinic, outpatient, and inpatient services.

Our community (ambulatory care) analysis compares the experiences of enrollees at the University of Texas Health Science Center at Houston's (UT Houston) HRCC who receive comprehensive care with those of a control group receiving usual care. It considers the impact on utilization and cost of the awardee's HRCC innovation. Our analysis is for Texas Medicaid beneficiaries, who make up 100 percent of HRCC enrollees.[303]

[303] Estimated percentage of Medicaid participants comes from awardee self-reported data. See Appendix C for more information about our analysis.

Exhibit HRCC.2 summarizes HRCC's multiple intervention phases. The original cohort recruited for the intervention comprised 156 high-risk children. Of those, 73 were randomly assigned to usual care as the control group, and 83 were assigned to a treatment group. After evidence of effectiveness emerged from the intervention, 32 participants were moved in Phase 2 to the treatment group. Forty-one patients stayed in the control group. During Phase 2, an additional 107 participants were recruited for the intervention. We explore outcomes during different phases of the intervention.

Exhibit HRCC.2: Enrollment for Treatment and Control Groups in the First and Second Phase of HRCC Program



Finder File, Creation of Analytic Sample, and Comparison Group. UT Houston provided a finder file of program participants and enrollment dates for treatment and control children who were part of the original RCT. All participants were linked to Texas Medicaid data.

Descriptive Characteristics. Exhibit HRCC.3 displays the descriptive characteristics of HRCC treatment and control beneficiaries by stage, with respect to demographics, comorbidities, and prior utilization:[304]

- **Phase 1, Original RCT Cohort:** We did not observe any statistically significant differences between the 83 children originally randomized to the HRCC program and the 73 children randomized to receive the control group.
- **Phase 2, Usual Care Group from Phase 1 and Those Who Switched to HRCC:** Of the 73 children who began the intervention in usual care, the 32 children whose families elected to join HRCC in the second phase had a statistically significant higher total Medicaid cost of care in the quarter prior to enrollment, compared with the 41 children whose families elected to remain in usual care.

[304] We tested differences between these groups with a t-test for continuous measures (comorbidities, cost, and utilization before index hospitalization) or chi-square test for categorical parameters (gender, age, race, ethnicity, risk stratum, maternal education, and managed care enrollment).

- **Phase 2, New Entrants:** The 107 children who were recruited to HRCC in the second phase of the trial were significantly younger, and a greater number had a very high risk of hospitalization, compared to children originally randomized to HRCC. These children also had significantly higher levels of health care utilization and higher total costs of care. Since this group of 107 new entrants was not originally part of the RCT and was significantly higher risk than the original cohort, we do not include these children in subsequent, summative analyses, in order to minimize bias related to lack of comparability with other Phase 2 enrollees.

Exhibit HRCC.3: Descriptive Characteristics for HRCC and Comparison Group Beneficiaries

Variable	Phase 1: Originally Randomized Cohort		Phase 2: Usual Care and Cross-over		Phase 2: New Entrants
	High-Risk Children's Clinic	Usual Care	Remained in Usual Care	Switched to HRCC	HRCC[§]
Number of Persons	83	73	41	32	107
Age % (N)					
0-12 months	16.9 (14)	13.7 (10)	17.1 (7)	9.4 (3)	23.4 (25)*
13 months-2 years	25.3 (21)	31.5 (23)	29.3 (12)	34.4 (11)	36.5 (39)*
3-5 years	25.3 (21)	23.3 (17)	17.1 (7)	31.3 (10)	14.0 (15)*
6-11 years	25.3 (21)	20.6 (15)	22.0 (9)	18.8 (6)	15.9 (17)*
12-18 years	7.2 (6)	11.0 (8)	14.6 (6)	6.3 (2)	10.3 (11)*
Race/Ethnicity % (N)					
White (including Hispanic)	55.4 (46)	67.1 (49)	63.4 (26)	71.9 (23)	54.2 (58)
Black (including Hispanic)	44.6 (37)	32.9 (24)	36.6 (15)	28.1 (9)	39.3 (42)
Hispanic	50.6 (42)	56.2 (41)	48.8 (20)	65.6 (21)	43.9 (47)
Gender % (N)					
Female	38.6 (32)	43.8 (32)	48.8 (20)	37.5 (12)	40.2 (43)
Risk Stratum[§§] % (N)					
High (50-75%)	88.0 (73)	89.0 (65)	92.7 (38)	84.4 (27)	63.6 (68)***
Very High (76-100%)	12.1 (10)	11.0 (8)	7.3 (3)	15.6 (5)	36.5 (39)***
Maternal Education % (N)					
High School Graduate	72.3 (60)	74.0 (54)	70.7 (29)	78.1 (25)	71.0 (76)***
Not High School Graduate	27.7 (23)	26.0 (19)	29.3 (12)	21.9 (7)	18.7 (20)***
Managed Care Enrollment (N)					
Managed Care	40.1 (34)	37.0 (27)	36.6 (15)	37.5 (12)	52.3 (56)
Mean Utilization and Cost in Quarter Prior to Program Enrollment (per 1,000 Beneficiaries unless noted)					
Total Medicaid Cost per beneficiary (SD; $)	$21,486 ($31,727)	$17,517 ($26,771)	$11,792 ($19,729)**	$24,852 ($32,610)**	$35,102 ($50,223)**
Medicaid Clinical Cost per beneficiary (SD; $)	$10,949 ($23,434)	$8,640 ($21,877)	$6,555 ($16,532)	$11,313 ($27,310)	$22,528 ($45,789)**
Hospitalizations (SD)	482 (651)	465 (625)	463 (596)	469 (671)	682 (820)*
ED Visits (SD)	518 (861)	521 (1,002)	512 (1,028)	531 (983)	457 (861)

NOTE: *p<0.10, **p<0.05, ***p<0.01. [§]Statistical significance is tested against children originally randomized to the HRCC program. [§§]Risk strata are assigned by awardee and operationalized as the risk of hospitalization in the next year as determined by the physician.

Impact of the HRCC Program. Exhibit HRCC.4 presents findings from models that assess the impact of the HRCC program, estimating the difference in average outcomes between treatment and control groups in the first and second phases of the intervention, as follows,[305]

- Phase 1 the treatment and control groups
- Phase 2: the new treatment (including those that switched from the control group to the treatment group) and control groups
- Phase 2 (sensitivity analysis): the 32 children whose families elected to join HRCC in Phase 2 compared to the children whose families elected to remain in usual care.

We report utilization measures as binary indicators.[306] We find the following for HRCC, relative to the comparison group:

- **Cost:** A statistically significant decrease in total clinic and hospital cost of care for Phase 1 and Phase 2 (-$1,790 per beneficiary and -$3,649 per beneficiary, respectively), a non-significant decrease in total cost of care in Phase 1, and a non-significant increase in total cost of care in Phase 2. We also note a statistically significant decrease in total clinic and hospital cost of care, and a non-significant decrease in total cost of care in the Phase 2 sensitivity analysis.
- **Utilization Measures:** A statistically significant decrease in hospitalizations and ED visits in Phase 1 of the intervention (-36 per 1,000 beneficiaries and -83 per 1,000 beneficiaries, respectively), and a non-significant decrease in hospitalizations and ED visits for Phase 2. We also note a statistically significant decrease in ED visits (-55 per 1,000 beneficiaries) and a non-significant decrease in hospitalizations in the Phase 2 sensitivity analysis.

Exhibit HRCC.4: Impact of the HRCC Program on Outcomes, by Study Phase

Outcome Measure (per 1,000 Beneficiaries unless noted)	AVERAGE IMPACT[§]		
	Phase 1: Treatment (N=83) versus Control (N=73)	Phase 2: Treatment (N=115) versus Control (N=41)	Phase 2: Switchers (N=32) versus Control (N=41)
	Adjusted Estimate [90% Confidence Interval]	Adjusted Estimate [90% Confidence Interval]	Adjusted Estimate [90% Confidence Interval]
Total Cost of Care ($)	-$1,345 [-9,016; 6,296]	$18,046 [-973; 37,065]	-$1,051 [-12,463; 10,360]
Total Clinic and Hospital Cost of Care ($)	**-$1,790 [-$3,445; -$135]***	**-$3,649 [-$6,755; -$543]***	**-$3,374 [-$6,618; -$131]***
All-cause Hospitalizations	**-36 [-66, -6]****	-46 [-99, 8]	-43 [-119, 33]
Emergency Department Visits	**-83 [-119, -47]*****	-17 [-87, 53]	**-55 [-109, -1]***

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold** font indicates statistically significant findings. [§]Impact is the average estimate per phase of program enrollment.

Quality of Care (Qualitative Findings)

NORC's evaluation uses qualitative data from interviews and one site visit to assess the impact of HRCC on quality of care, measured in terms of timeliness of services delivery and the experience of informal (unpaid) family caregivers.

[305] Adjustment factors include age, race/ethnicity, very high-risk stratum indicator, and maternal education.

[306] See Appendix C for more information on our analysis.

Timeliness of Services Delivery. Parent caregivers participating in a focus group credited HRCC with increasing access to care when needed and being especially responsive to their phone calls. One parent remarked that it was easy to get in touch with their child's doctor when they thought their child's condition might be exacerbated. They appreciated being able to discuss their child's condition with their doctor, to receive guidance and know whether they needed to bring their child into the hospital. A number of parents reported that their children had far fewer hospitalizations because they could receive guidance over the phone and avoid visits to the ED.

> "Once [the intervention doctor] got him on a plan to manage his asthma he has only been hospitalized twice. He can play now, and only gets really bad when he has a cold or fever. I can call in and they'll already call in the antibiotic and then he's fine. The person you call knows the deal and you can come right in… I really, really love this clinic.'"
>
> --Parent Caregiver

Informal Caregiver Experience. Parent caregivers reported high satisfaction with the intervention. They noted that HRCC staff knows them and their child's condition and medications very well, and that they quickly receive answers to their questions or concerns. One parent remarked that the doctor cares for their child like it is their own, and that they trust and confide in their doctors. Another parent remarked that the HRCC doctors help her feel empowered; because of their education and instruction, she feels like she can better handle her child's condition.

Workforce Development

Staffing. The HRCC staffing model relies on a small group of dedicated staff and physicians, including a number of part-time specialists (a pulmonologist, a gastroenterologist, a neurologist, a pediatric surgeon, and an adolescent medicine specialist); full-time pediatric nurse practitioners (NPs); and one full-time social worker. In many cases NPs serve as the direct point of contact between the provider team and the participant or participant's family, whereas the physicians are brought in as needed to adjust the care plan. Clinic providers reported that they enjoyed being able to spend several hours if needed during a patient visit, to educate and coach parents in care protocols and address all concerns. They cited this as very important to their job satisfaction.

Training. The training of staff within the clinic is informal but continuous, with weekly staff debriefs to discuss participant issues and provider responses, and to identify possibilities for improvement. HRCC staff noted that these debriefs often work to identify situations and solutions that may be transferable to other patients and situations, so this is an important part of their quality improvement process. Training is predominately hands-on and consultative across team members. Ongoing training of existing or added intervention staff is informal and primarily based on shadowing and team meetings. Since HRCC is located in a teaching hospital, there are also training and clinical rotations for student nurse practitioners (120 hours) and for medical students (100 hours).

Implications for Workforce. As noted in NORC's Second Annual Report to CMMI (2016), the HRCC relies on the dedication of a core group of clinicians and an experienced physician champion, which may be difficult to replicate or scale beyond the scope of the HRCC innovation itself.

Context: the HRCC in its Third Year

The HRCC has been operating as a relatively small, self-contained innovation that has benefitted from strong support from Memorial Hermann Hospital and the UT Houston medical school, as well as the positive reputation of the intervention in the community. The principal investigator's guidance has been key to HRCC's success. For example, Dr. Tyson's leadership and reputation have helped recruit dedicated staff for this intensive intervention and obtain funding from NAIP, HHS, and Medicaid MCOs. UT Houston continues to seek a direct capitation rate from Texas Health and Human Services and the Medicaid Health Maintenance Organization (HMO) plans. HRCC must currently navigate multiple administrative and reimbursement arrangements with several TX MCOs, which impose great administrative burden and provide inconsistent financial support.

Sustaining and Scaling the HRCC

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 its pre-HCIA pilot and from Memorial Hermann Hospital. Memorial Hermann Hospital System and UT Medical School are partners in the HRCC intervention, with Memorial Hermann providing some institutional and financial support. In collaboration with the TX Medicaid MCO Amerigroup, Community Health Choice and UnitedHealthcare, HRCC has received support through August 2017 from federally matched funds provided by NAIP, and will seek funding for 2018 as well. UT Houston staff also received a KL2 award through the National Institutes of Health to support HRCC staff.

Since publication of HRCC's internal evaluation findings in the *Journal of the American Medical Association* at the end of 2014, inquiries about the HRCC model from around the country have increased. HRCC leadership notes that in order 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, it needs a unified Medicaid policy regarding coverage and payment for services.

Summary

Our claims-based analysis of UT Houston's HRCC program shows significantly fewer hospitalizations and ED visits for enrolled children relative to the control group in the first phase of the intervention. HRCC participants experienced decreases in total clinic, outpatient, and inpatient cost of care in both Phase 1 and Phase 2 of the intervention; however, we found no statistically different changes for total cost of care; such change would not be expected, given the limited impact expected on certain types of utilization seen with this population of high-needs children. There were no statistically significant decreases in utilization for Phase 2. The sensitivity analysis for Phase 2 showed a statistically significant decrease in ED visits but not in hospitalizations.

There are several limitations to our analysis. First, the study population overall is very small, which limits our power to detect statistically significant differences in measures with possible outliers. Second, results for the second phase of the intervention are subject to bias because of the change in protocol allowing participants to cross over from the usual care to the treatment group. This change in protocol, which was enacted due to strong evidence of program effectiveness, introduced a bias into treatment group selection

as children who elected to join HRCC may have systematically differed from those who elected to remain in usual care. We observed that children who joined HRCC had greater total costs of care prior to joining the intervention, which suggests that health-related factors may have been part of the decision to join HRCC.

Caregivers expressed great satisfaction with the HRCC intervention, especially the increased access to providers, caregiver education, and empowerment. They greatly appreciated the ability to contact a provider anytime they needed to discuss their child's symptoms and also felt confident that their provider was intimately aware of their child's condition and could provide sound guidance. In addition, caregivers also noted that they were better able to care for their child's condition and felt confident knowing when their child needed medical attention.

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Vanderbilt University Medical Center

Reducing Hospitalizations in Medicare Beneficiaries. Linkage of two quality improvement tools –IMPACT and INTERACT --to improve care and reduce readmissions for Medicare beneficiaries discharged from Vanderbilt University Medical Center (VUMC) to one of 23 partner skilled nursing facilities (SNFs).

PROGRAM MODELS: Care/Case Coordination, Clinician Decision Supports, Pharmaceutical Care, Transitional Care

LOCATION: Nashville, TN
GRANT: $2,449,241
AWARD DATES: 1/17/13 to 6/30/15
NO-COST EXTENSION: N/A
PAYER(S): Medicare

REACH: 1,691 participants (94 percent of target)
POPULATIONS: Older Adults
DATA: Medicare claims (1/11-12/15); one site visit (4/14), telephone interviews with leadership (2014 to 2016)

- In-hospital team (IMPACT) led by Transitions Advocate compiles post-discharge plan of care and coordinates with SNFs on an ongoing basis.
- Implementation challenge of VUMC's limited influence on SNF operating procedures.

- In-hospital staff team comprised of nurse practitioners, pharmacists, and research assistants.
- SNF staff are trained to use INTERACT as part of clinical operations.

- Clinical staff and research assistants identify participants using risk algorithm drawing on EMR data.
- VUMC chose partner SNFs based on volume of discharges and previous working relationships.

OUTCOMES[§]

- No findings reach statistical significance

- Decrease in emergency department visits [-70 per 1,000 beneficiary-episodes per quarter)

- Increase in 30-day practitioner follow-up visits after hospital discharge (58 per 1,000 beneficiary-episodes per quarter)

SUSTAINABILITY, REPLICABILITY, & SCALING

The full IMPACT program within VUMC is not being continued post-HCIA, but components (transition wizard, medication management form, and NuTS form) are expected to be integrated into existing VUMC operations. The INTERACT component is being integrated into clinical operations at the partner SNFs.

VUMC hosts a readmission collaborative that allows the awardee to promote their assessment tool and other intervention components for use beyond SNF patients, but there are no current plans to replicate or scale.

[§]Outcomes for cost, utilization, and quality of care are from analyses that include a comparison group and are statistically significant at the p<0.10 level.

Overview of the Reducing Hospitalizations in Medicare Beneficiaries Program

Background. The Vanderbilt University Medical Center (VUMC) HCIA Program aims to improve care and reduce re-hospitalizations for Medicare beneficiaries discharged from 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.

Goals. In addition to the CMMI core performance measures, VUMC has also been internally tracking incidence of geriatric syndromes among patients in the study population. VUMC has identified these conditions as being highly predictive of readmissions—weight loss, loss of appetite, depression, delirium, cognitive impairment, pain at discharge, incontinence, pressure ulcers, and recent falls. VUMC has also been tracking measures of hyperpolypharmacy, defined by the awardee as a patient taking 10 or more medications simultaneously. The awardee notes that a previous study within VUMC identified a link between number of medications and number of geriatric syndromes, suggesting that hyperpolypharmacy might offer additional insight into understanding readmissions.

Program Models and Practices. The VUMC intervention seeks to reduce readmissions post-discharge from SNFs by implementing a series of interventions both in-hospital and in-SNF. The in-hospital component, known as IMPACT, focuses on improving documentation and streamlining communication for discharge to the SNF. Patients admitted to VUMC are paired with a transitions advocate (TA), generally a nurse practitioner, who works with clinical staff to conduct a series of steps while the patient is in the hospital. VUMC pharmacists work to reconcile admission, in-hospital, and discharge/transfer medication lists into a unified document that provides up-to-date information on medications the patient is taking. The TA and research assistants (RAs) within VUMC compile information from the medical record into a short summary document, known as a nursing transition summary (NuTS). This document is the basis for future communication between the TA and SNF. The TA also conducts what is called a "warm hand-off" call with the SNF as the patient is being discharged, reviewing the information in the NuTS form. The TA then follows up with the SNF after 72 hours to address any remaining questions.

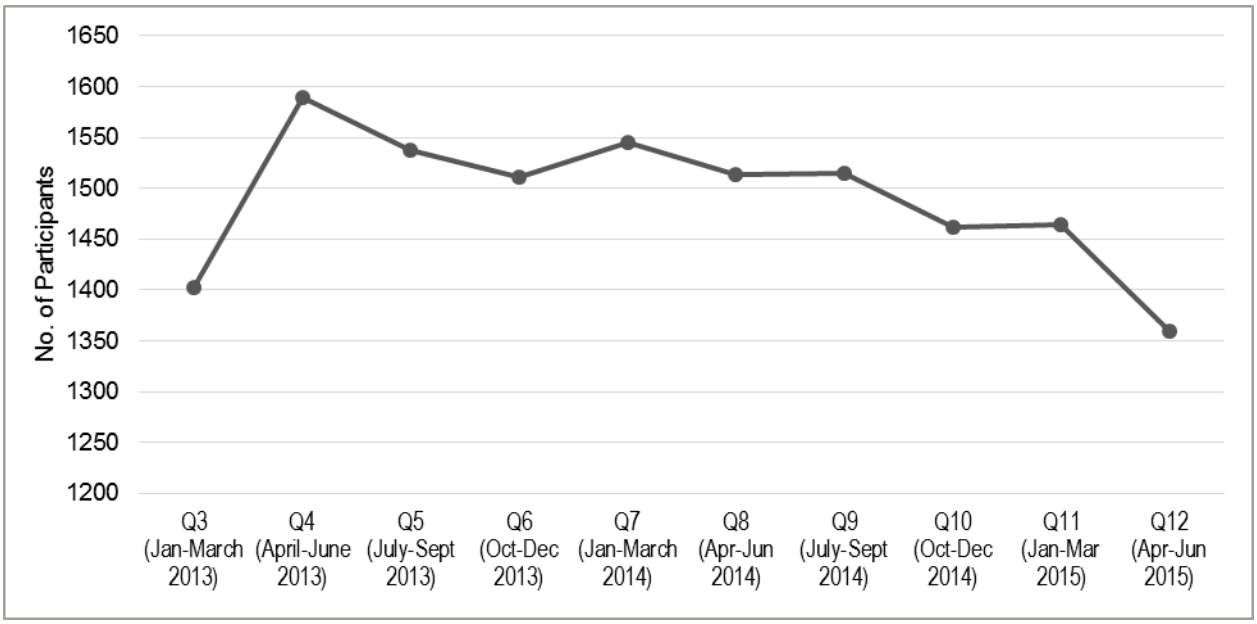
The in-SNF component uses structured tools in order to facilitate better communication among SNF staff. The partner SNFs use tools from the INTERACT program, developed by Dr. Joseph Ouslander at Florida Atlantic University. These tools, many of which are integrated into the SNF electronic medical records (EMRs), allow SNF staff to communicate with one another in a more standardized fashion that helps facilitate quality improvement.

Implementation Updates. Since NORC's Second Annual Report (September 2016), the VUMC program has made few changes to its model. VUMC has focused many of its efforts on continuing to monitor geriatric syndromes and polypharmacy, while also considering options for sustainability. The IMPACT team at VUMC has partnered with the VUMC Transition Management Office (TMO), which coordinates transition programming across the entire VUMC system. Elements of the IMPACT program are being streamlined and incorporated into hospital operations through a Transition Wizard system. The Transition Wizard will allow the hospital to automate generating some of the detailed transition information, such as

relevant information on the NuTS form and medication reconciliation, for all patients transferred to post-acute care.

Reach and Demographic Profile of Enrolled Beneficiaries. As of June 30, 2015, VUMC had served a cumulative total of 1,691 unique patients since program launch, comprising 94 percent of the total number projected to be served over the three years of the HCIA-supported program (1,800 participants). Enrollment in the VUMC intervention rose rapidly through June 2013, and then declined steadily over time throughout the remainder of the grant (see Exhibit VUMC.1).[307] During the most recent and final quarter for which data are available (April 1 through June 30, 2015), the program served 1,359 direct and indirect participants (59 were directly served, while the remaining 1,300 are SNF patients counted as indirectly served). About half of participants are between 65 and 74 years old (48 percent), with the other half are older than 75 (53 percent). Fifty six percent are female. Most participants are identified as White (92 percent), with a smaller proportion as Black or African American (9 percent).

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



Summative Findings (Outcomes)

VUMC decreases the number of emergency department (ED) visits and improves 30-day practitioner follow-up in the post-acute care (primary) analysis. We also observe non-significant reductions in utilization and cost outcomes for participants during the last 30 days of life in the end-of-life analysis. In a new analysis of geriatric syndromes and program impact, we find no clear trend between cost and utilization outcomes and the number of geriatric syndromes attributed to VUMC participants.

[307] Counts are based on awardee data self-reported to CMMI on a quarterly basis. The most recent VUMC self-reported data available for NORC's AR3 is for HCIA reporting quarter 12, for the time period April 1 through June 30, 2015.

In the section below, we present our analyses of program effectiveness, based on two types of data: Medicare Fee-For-Service (FFS) claims and narrative from NORC interviews and site visits. We present results from three analyses of VUMC's IMPACT-INTERACT program after discharge to a partner SNF:

- **Hospital Analysis: Post-Acute Care.** We conduct difference-in-differences (DID) analyses for FFS Medicare beneficiary-episodes in VUMC's program between January 1, 2013, and September 30, 2015, using a comparison group of FFS Medicare beneficiary-episodes discharged from VUMC to SNFs that did not participate in the intervention.
- **Community (Sensitivity) Analysis: Geriatric Syndrome Categories.** We examine the experience of VUMC participants and the same group of comparators as those used with the primary analysis once they were admitted to a SNF, using the same analytic framework as our analyses for community-based interventions. The two-year period prior to admission to a SNF (following the index hospitalization) serves as the pre-period in the sensitivity analysis and the nine-month period beginning with the SNF admission serves as the post-period. We evaluate outcomes for participants grouped into three categories of geriatric syndromes: low (one to two syndromes), medium (three to four syndromes), and high (five or more syndromes).
- **Community (Sensitivity) Analysis: End-of-Life Experience.** We compare the experience of VUMC participants in the last 30 days of life with the experience of matched comparators with respect to utilization and cost outcomes.

Core and Supplemental Measures: Hospital Analysis

Our hospital analysis compares the experiences of VUMC enrollees with those of a weighted comparison group. It considers the impact on utilization, cost, and quality of care of the awardee's IMPACT-INTERACT innovation over the entire course and each quarter of program implementation. Our analysis is for Medicare FFS beneficiaries in the IMPACT-INTERACT program, comprising 100 percent of all IMPACT-INTERACT enrollees.[308]

Measures (per 1,000 beneficiary-episodes unless noted)
- 90-day Hospitalizations
- 90-day ED Visits
- 90-day ED Visit Counts
- 30-day Readmissions
- 90-day Total Cost of Care per Beneficiary-episode
- 30-day Practitioner Visit (PV) follow-up[§]

[§]Results are not presented for 7-day PV follow-up, since discharges from VUMC are to Skilled Nursing Facilities (SNF)

Finder File and Creation of Analytic Sample, Hospital Analysis. VUMC provided a finder file that lists program participants and their enrollment dates, enabling us to use Medicare claims in the CMS Virtual Research Data Center (VRDC) to calculate outcome measures.[309] We have identified 925 unique beneficiary-episodes and further limited this number by enrollment date; Medicare identifiers; admission date; discharge date; whether it was 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 an analytic sample of 877 beneficiary-episodes.

[308] See Appendix C for more about our analytic approach.

[309] Medicare claims January 1, 2011 through December 31, 2015. Discharges before June 30, 2015, allowing for 90 day episodes through September 30, 2015. And claims run off through December 31, 2015.

Comparison Group, Hospital Analysis. We use Medicare claims to create an internal comparison group comprising FFS Medicare beneficiary-episodes discharged during the pre-intervention period. We also use claims-based rules to identify an external comparison group, comprising Medicare beneficiary-episodes discharged from VUMC to non-intervention SNFs during the pre-intervention and post-intervention periods. We use propensity score weighting (standardized mortality ratio weights) to find suitable comparators; incorporation of SMR weights minimizes observed differences in beneficiary-episode characteristics between the VUMC treatment and comparison groups. Tests of common support and covariate balance across treatment and comparison groups indicate that propensity score weighting improves comparability.[310]

Descriptive Characteristics, Hospital Analysis. Exhibit VUMC.2 displays the descriptive characteristics of beneficiary-episodes (discharges) 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.[311] We observe that the VUMC post-intervention group is older, has fewer comorbidities, had fewer ED visits in the year prior to enrollment, and was more likely to obtain Medicare coverage due to age.

Exhibit VUMC.2: Descriptive Characteristics for IMPACT-INTERACT and Comparison Group Beneficiary-Episodes, Hospital Analysis

	Pre-Intervention		Post-Intervention	
	Vanderbilt	Comparison	Vanderbilt	Comparison
Number of Beneficiary-Episodes	665	1,518	877	2,549
Number of Implementation Quarters	8	8	10	10
Age* % (N)**				
<65 years	14.1 (94)	18.8 (286)	10.6 (93)	17.7 (451)
65-69 years	8.6 (57)	14.6 (221)	13.2 (116)	15.3 (389)
70-74 years	20.3 (135)	16.7 (253)	16.8 (147)	16.8 (427)
75-79 years	17.4 (116)	16.1 (245)	16.4 (144)	16.3 (415)
80-84 years	15.8 (105)	15.9 (242)	20.1 (176)	16.3 (415)
≥ 85 years	23.8 (158)	17.9 (271)	22.9 (201)	17.7 (452)
Race/Ethnicity % (N)				
White	87.1 (579)	87.8 (1333)	87.8 (770)	88.2 (2248)
Black	10.4 (69)	11.1 (169)	11.1 (97)	10.4 (265)
Other	2.6 (17)	1.1 (16)	1.1 (10)	1.4 (36)
Gender % (N)				
Female	65.0 (432)	57.5 (873)	58.4 (512)	57.9 (1477)

[310] For more detailed information on propensity score weighting and tests of common support and covariate balance, please refer to Appendix D.

[311] We tested differences between the groups with 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).

	Pre-Intervention		Post-Intervention	
	Vanderbilt	Comparison	Vanderbilt	Comparison
Coverage Reason* % (N)**				
Age	74.4 (495)	64.7 (982)	74.9 (657)	65.0 (1658)
Disability	22.7 (151)	32.8 (498)	22.8 (200)	31.1 (794)
ESRD	0.6 (4)	0.7 (10)	0.7 (6)	1.5 (38)
Disability & ESRD	2.3 (15)	1.8 (28)	1.6 (14)	2.3 (59)
Hierarchical Condition Categories (HCCs)				
Mean Count of HCCs (SD) **	5.7 (3.5)	5.9 (3.4)	5.7 (3.5)	6.0 (3.5)
Mean HCC Score (SD)*	3.5 (2.1)	3.6 (2.1)	3.5 (2.1)	3.6 (2.1)
Mean Utilization and Cost in Year Prior to Program Enrollment (per 1,000 Beneficiary-episodes unless noted)				
Total Medicare Cost per beneficiary-episode (SD; $)	$41,076 ($52,046)	$44,507 ($52,317)	$39,323 ($49,383)	$41,628 ($48,373)
Hospitalizations (SD)	1,410 (1,773)	1,711 (2,065)	1,439 (2,000)	1,560 (2,083)
ED Visits (SD)***	1,422 (2,058)	2,001 (4,293)	1,317 (1,756)	1,842 (2,706)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of IMPACT-INTERACT Program, Hospital Analysis. Exhibit VUMC.3 displays the average quarterly and aggregate impact of the IMPACT-INTERACT innovation on its participants relative to the comparison group. With the exception of the 90-day ED visit count, we report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary-episode.[312] For the 90-day ED visit count measure, we report estimates as a count of ED visits in each quarter, so that multiple ED visits by the same beneficiary are included. We also present estimates that assess the impact of the IMPACT-INTERACT program on the same utilization measures following SNF discharge. We find the following for the IMPACT-INTERACT program, relative to the comparison group:

- **Cost:** No significant decrease in 90-day total cost of care.
- **Utilization Measures:** No significant decreases in beneficiaries with 90-day hospitalizations, 90-day ED visits, or 30-day readmissions. However, we observe a significant decrease in the number of ED visits (-70 per 1,000).
- **Quality of Care:** A significantly greater 30-day practitioner follow-up than the comparison group (58 per 1,000 beneficiary-episodes).
- **Utilization after Discharge from SNF:** A non-significant decrease in 90-day ED visits after SNF discharge, as well as non-significant increases in 90-day hospitalizations and 30-day readmissions after SNF discharge.

[312] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Exhibit VUMC.3: Impact of IMPACT-INTERACT Program on Outcomes, Hospital Analysis

AVERAGE QUARTERLY IMPACT[§]	
Outcome Measure (per 1,000 Beneficiary-episode unless noted)	**Adjusted Estimate (90% Confidence Interval)**
90-day Total Cost of Care per Beneficiary-episode ($)	$29 [-$1,486; $1,544]
90-Day Hospitalizations	17 [-14, 48]
90-Day ED Visits	-11 [-43, 21]
90-Day ED Visit Count	**-70 [-136, -4]***
30-Day Readmissions	25 [-3, 53]
30-Day Practitioner Follow-up	**58 [43, 73]*****
Utilization After SNF Discharge	
90-Day Hospitalizations	3 [-29, 35]
90-Day ED Visits	-13 [-45, 19]
30-Day Readmissions	18 [-12, 48]
AGGREGATE IMPACT[§§]	
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care ($)	$24,183 [-$1,244,148; $1,292,514]
90-Day Hospitalizations	15 [-12, 42]
90-Day ED Visits	-10 [-38, 18]
90-Day ED Visit Count	**-61 [-119, -4]***
30-Day Readmissions	22 [-3, 47]
30-Day Practitioner Follow-up	**51 [38, 64]*****
Utilization After SNF Discharge	
90-Day Hospitalizations	2 [-16, 20]
90-Day ED Visits	-8 [-27, 11]
30-Day Readmissions	11 [-6, 28]

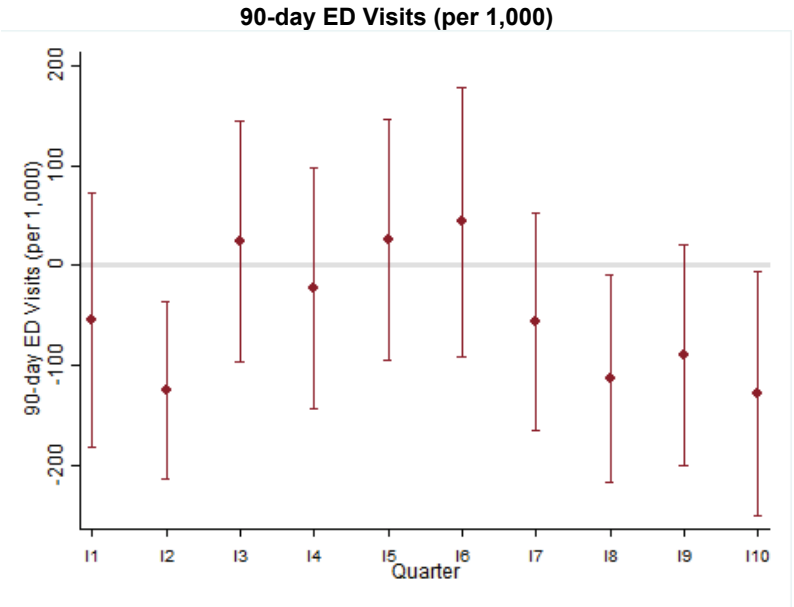
NOTE: *p<0.10, **p<0.05, ***p<0.01.
[§]Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. [§§]Aggregate Impact is the total DID estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of program participants (877) and total length of program implementation included in the analysis (10 quarters).

Impact of IMPACT-INTERACT in Each Quarter of Enrollment, Hospital Analysis. With the exception of 90-day ED visits, findings from a quarterly fixed effects (QIF) DID model of impact in each intervention implementation quarter are consistent with the average quarterly impact summarized above. Exhibit VUMC.4 displays the results of the QFE DID model for 90-day ED visits; [313] please see Appendix D for presentation of the remaining QFE DID charts.

In Exhibit VUMC.4, we observe a decreasing trend in 90-day ED visits in the last four quarters of the implementation. In quarters I8 and I10, we observe a significant decrease in 90-day ED visits.

[313] See Appendix C for a more detailed explanation of the QFE DID models and measure specification. For utilization and quality of care measures, the effect is displayed as the average difference (and 90 percent confidence interval) between intervention and comparison per 1,000 beneficiary-episodes for each quarter.

Exhibit VUMC.4: Impact of IMPACT-INTERACT Program on ED Visits, Hospital Analysis, by Quarter



Core and Supplemental Measures: Geriatric Syndrome Categories (Community Analysis)

This community (sensitivity) analysis compares the experiences of VUMC participants with those of a matched group of comparators. It considers the impact on utilization, cost, and quality of care of the awardee's IMPACT-INTERACT innovation over the enrollment period as a whole, stratifying by the number of geriatric syndromes experienced by VUMC participants.

Measures (per 1,000 beneficiaries)
- Total Quarterly Cost of Care
- All-cause Hospitalizations
- ED Visits
- 30-day Readmissions
- Ambulatory Care-sensitive (ACS) Hospitalizations

Finder File and Creation of Analytic Sample, Geriatric Syndromes Analysis. Using a participant-level community file, we compare the experience of VUMC enrollees with the different numbers of geriatric syndromes.[314] We use the same finder file that VUMC provided for the hospital analysis, which includes instances of multiple VUMC beneficiary-episodes attributed to the same beneficiary, as beneficiaries discharged to SNFs are more likely to have patterns of high utilization; for this community analysis we include only the first episode experienced by any participant in our beneficiary-level analysis. After we remove duplicate beneficiaries, our final analytic sample contains 558 beneficiaries.

We also received data on geriatric syndromes for IMPACT-INTERACT participants from VUMC. For our sensitivity analysis, we stratify VUMC participants into low (one to two syndromes), medium (three to four syndromes), and high (more than five syndromes) categories of geriatric syndromes, and then assess impact within each category. Geriatric syndromes include the following:

[314] See Appendix C for more about our analytic approach.

- Delirium at any point during hospital stay
- Depressive symptoms and/or cognitive impairment
- Weight loss one month prior or during hospital stay and appetite loss since being admitted
- Bladder or bowel accidents (any incontinence)
- Falls during the last three months
- Pressure ulcer during hospital stay
- Hyperpolypharmacy
- Pain at discharge

Comparison Group, Geriatric Syndromes Analysis. The comparison pool consists of beneficiaries at VUMC discharged to non-partner SNFs during the post-intervention period. We used propensity matching to find suitable comparators.[315] The final propensity score model includes age, race, gender, dual eligibility, ESRD, disability status, HCC score, and prior-year utilization (hospitalizations and ED visits) and cost. Data are not available ot enable matching geriatric syndromes for the comparators.

Impact of IMPACT-INTERACT Program, Geriatric Syndromes Analysis. Exhibit VUMC.5 displays the average quarterly and aggregate impact of the IMPACT-INTERACT innovation on its participants in the three geriatric syndrome categories for participants relative to a matched comparison group, in the first three quarters after program enrollment. We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter). We find the following for the IMPACT-INTERACT program, relative to the comparison group:

- **Cost Measures:** A significant increase in total quarterly cost of care for the low and medium geriatric syndrome categories of $2,717 and $4,609 per beneficiary, respectively. For participants with five or more geriatric syndromes, we see a non-significant increase in cost.
- **Utilization measures:** A non-significant decrease in ED visits per quarter for the low and medium geriatric syndrome categories, and 30-day readmissions per quarter in the low and high geriatric syndrome categories. However, we see a significant increase in ED visits per quarter for participants with more than five geriatric syndromes (74 per 1,000 beneficiaries). For hospitalizations per quarter , we observe a significant increase for participants with one to two geriatric syndromes (58 per 1,000 beneficiaries) and non-significant increases for all other participants. Overall, there is no clear trend in utilization as we look across the categories of geriatric syndromes.
- **Quality of Care:** A non-significant increase in ACS hospitalizations per quarter for participants with one to two geriatric syndromes, relative to the comparison group. For participants in the medium and high categories, we see non-significant decreases in ACS hospitalizations.

[315] For more information on propensity score matching, please refer to Appendix C.

Exhibit VUMC.5: Effect of IMPACT-INTERACT Program by Number of Geriatric Syndromes, Community Analysis

AVERAGE QUARTERLY IMPACT§			
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate (90% Confidence Interval)**		
	Low (1-2 Geriatric Syndromes)	**Medium (3-4 Geriatric Syndromes)**	**High 5+ Geriatric Syndromes)**
N	**174**	**242**	**142**
Total Cost of Care per Beneficiary ($)	**$2,717 [$735; $4,699]****	**$4,609 [$371; $8,847]***	$1,185 [-$1,101; $3,471]
Hospitalizations	**58 [1, 115]***	10 [-33, 53]	56 [-9, 121]
ED Visits	-11 [-59, 37]	-23 [-64, 18]	**74 [13, 135]***
30-Day Readmissions	-18 [-130, 94]	3 [-84, 90]	-5 [-147, 137]
ACS Hospitalizations	18 [-10, 46]	-4 [-26, 18]	-28 [-63, 7]
AGGREGATE IMPACT§§			
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**		
Total Cost of Care ($)	**$1,040,759 [$281,629; $1,799,889]****	**$2,327,494 [$187,378; $4,467,610]***	$339,990 [-$316,105; -$96,085]
Hospitalizations	**22 [0, 44]***	5 [-17, 27]	16 [-3, 35]
ED Visits	-4 [-23, 15]	-11 [-31, 9]	**21 [4, 38]***
30-Day Readmissions	-7 [-50, 36]	2 [-42, 46]	-2 [-43, 39]
ACS Hospitalizations	7 [-4, 18]	-2 [-13, 9]	-8 [-18, 2]

NOTE: *p<0.10, **p<0.05, ***p<0.01.
§Quarterly Impact is the average quarterly DID estimate per quarter of program implementation. §§Aggregate Impact is estimated for this awardee based on total number of program participants (as noted above) and total length of program implementation included in analysis (10 quarters).

Core Measures: End-of-Life Experience (Community Analysis)

This community (sensitivity) analysis compares the experience of VUMC participants in the last 30 days of life with that of a matched comparison group. It considers the impact on cost and utilization outcomes.

Measures (per 1,000 beneficiaries) for End-of-Life Analysis
- Total Cost of Care in Last 30 Days
- All-cause Hospitalizations in Last 30 Days of Life
- ED Visits in Last 30 Days of Life

Finder File and Creation of Analytic Sample, End of Life Experience. We use the same finder file VUMC provided for the primary analysis and include only participants who died after program enrollment. Our final analytic sample consists of 277 VUMC participants.

Comparison Group, End of Life Experience. The comparison pool consists of beneficiaries at VUMC discharged to non-partner SNFs who died after program enrollment. We use propensity score matching to find suitable comparators.[316] The final propensity score model includes age, race, HCC score, and prior-year utilization (hospitalizations and ED visits) and cost. Tests of common support and covariate balance

[316] For more information on propensity score matching, please refer to Appendix C.

across treatment and comparison groups indicate that propensity score matching improves comparability.[317]

Descriptive Characteristics, End Of Life Experience. Exhibit VUMC.6 displays the descriptive characteristics of beneficiaries in the treatment and comparison groups, with respect to demographics, comorbidities, and prior utilization.[318] We observe no significant differences between the VUMC beneficiaries and comparison beneficiaries on these characteristics.

Exhibit VUMC.6: Descriptive Characteristics for IMPACT-INTERACT and Comparison Group Beneficiaries, End of Life Analysis

Variable	Vanderbilt	Comparison
Number of Beneficiaries	277	277
Gender % (N)		
Female	50.5 (140)	50.9 (141)
Age Group % (N)		
<65 years	9.4 (26)	8.7 (24)
65-69 years	10.8 (30)	8.7 (24)
70-74 years	13.4 (37)	15.5 (43)
75-79 years	14.4 (40)	17.7 (49)
80-84 years	20.2 (56)	19.1 (53)
85+ years	31.8 (88)	30.3 (84)
Race/Ethnicity % (N)		
White	88.4 (245)	89.2 (247)
Black	10.5 (29)	9.7 (27)
Hierarchical Chronic Conditions (HCC)		
Mean HCC Score (Standard Deviation)	5.1 (2.5)	5.2 (2.3)
Mean Count of HCCs (SD)	7.9 (3.8)	8.2 (3.4)
Mean Utilization and Cost in Year Prior to Death (per 1,000 beneficairies unless noted)		
Total Medicare Cost (SD; $)	$66,538 ($51,513)	$66,368 ($51,815)
Hospitalizations (SD)	2274 (1795)	2213 (1902)
ED Visits (SD)	1498 (1665)	1502 (1805)

NOTE: *p<0.10, **p<0.05, ***p<0.01.

Impact of IMPACT-INTERACT Program, End of Life Experience. Exhibit VUMC.7 assesses the adjusted impact of the IMPACT-INTERACT program in the last 30 days of life, relative to the comparison group.[319] We find the following, relative to the comparison group:

- **Cost:** A non-significant decrease in cost in the last 30 days of life.
- **Utilization Measures:** A non-significant decrease in hospitalizations and ED visits in the last 30 days of life.

[317] For more detailed information on propensity score matching and tests of common support and covariate balance, please refer to Appendix D.

[318] We tested differences between the groups with 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).

[319] Adjustment factors include age, gender, race, HCC score, disability, ESRD, and prior-year utilization (hospitalizations and ED visits) and cost.

Exhibit VUMC.7: Impact of IMPACT-INTERACT Program on Outcomes, End-of-Life Analysis

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care per Beneficiary ($)	-$2,176 [-$4,508; $155] ^
All-Cause Hospitalizations	-45 [-112, 22]
ED Visits	-22 [-84, 40]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**
Total Cost of Care ($)	-$602,752 [-$1,248,716; $42,935] ^
All-Cause Hospitalizations	-12 [-31, 6]
ED Visits	-6 [-23, 11]

NOTE: ^ Finding is significant at the .125 level. §Average quarterly impact is the average quarterly DID estimate per quarter of program implementation. §§Aggregate impact is the total DID estimate for all program participants in the last 30 days of life across all quarters of program implementation. Aggregate impact is estimated for this awardee based on the total number of program participants in the last 30 days of life (277) and total length of program implementation included in analysis (10 quarters).

Workforce Development

Staffing. A nurse practitioner or registered nurse (Transition Advocate) within VUMC, is responsible for leading the IMPACT team and compiles all the relevant patient information to send to the SNF when the patient is discharged to allow for a smooth transition. One of the more interesting developments in the VUMC workforce has been the expanded scope of work for RAs: RAs are responsible for a majority of chart reviews, where they identify participants for the IMPACT program, compile information from the VUMC EMR, and conduct and analyze patient interview data in the web application REDCap. VUMC has been able to leverage the abilities of RAs to allow them to address bottlenecks during clinical workflow, particularly when clinical staff is busy or discharges are more frequent. The exceptions to RA capabilities are medication reconciliation, which is conducted by pharmacists; calls with the SNF, which are led by the TA; and advance care planning discussions, which are also led by the TA.

> "I think [INTERACT] has become more of the culture in our centers. We aren't introducing the INTERACT program; it is just the way we do it. New staff might not even be aware we are in a grant."
>
> --VUMC Partner SNF Staff

Training. SNF partner training is given on INTERACT, for CNAs and nursing staff, while implementation partner Florida Atlantic University delivered webinars to train the facility champions.

Implications for Workforce. Among partner SNFs, it is important to note that nursing homes operated by the National Healthcare Corporation (which comprises 21 of the 23 partner SNFs) have implemented the INTERACT tools for all patients regardless of whether they are part of the IMPACT-INTERACT study. SNF staff interviewed during site visits reported that the INTERACT tools were no longer viewed as separate from normal operations; according to one staff member, they were "how we do [our jobs]." All new and current SNF staff are trained to use INTERACT tools. While the SNFs reported some turnover in staffing, they also reported that turnover was not due to the INTERACT tools, but rather to broader systemic factors common in the field (i.e., low pay, ease of transfer).

Context: the IMPACT-INTERACT Program in its Third Year

The VUMC intervention is a relatively small innovation in which VUMC project staff benefited from established working relationships with the partner SNFs. Further, the medical director at two of the partner SNFs is a current VUMC physician. IMPACT staff also regularly calls into SNF quality improvement meetings in order to discuss potentially preventable readmissions.

Sustaining the IMPACT-INTERACT Program

The VUMC HCIA program ended June 30, 2015. While the entire program itself will not be continued, elements of the NuTS form and medication reconciliation work will continue as part of the Transitions Wizard program within VUMC. IMPACT staff members have also mentioned that they plan to publish information about lessons learned from the program, including some of the research surrounding polypharmacy and geriatric syndromes.

Summary

We observe among VUMC participants a significant decrease in the number of ED visits and a significant increase in 30-day practitioner follow-up visits per quarter in the post-acute care (hospital) analysis. We also observe non-significant reductions in utilization and cost outcomes for participants in the last 30 days of life in the end-of-life sensitivity analysis. Overall, we find no clear trend between cost and utilization outcomes and the number of geriatric syndromes attributed to VUMC participants.

In the hospital analysis, the small sample sizes for some quarters in the post-intervention treatment group result in a lack of sufficient power to detect differences in the quarterly program estimates, which are reflected in the overall program effect estimate. Our sensitivity analyses were also constrained by a small sample size (<300 participants for each analysis). Additionally, our geriatric syndrome category sensitivity analysis was limited by the lack of geriatric syndrome data for the comparison group. As a result, we could not use geriatric syndrome data to improve propensity score matching or model adjustment.

References

HCIA Narrative Progress Report for Vanderbilt University Medical Center, for Reporting Quarter End Date 6/30/2015. Submitted by VUMC, 07/31/2015.

HCIA Quarterly Report for VUMC, for Reporting Quarter End Date 6/30/2015. Submitted by VUMC, 08/31/2015.

Serving Complex/High-Risk Beneficiaries: Policy-Relevant Themes and Lessons for Delivery System Reform

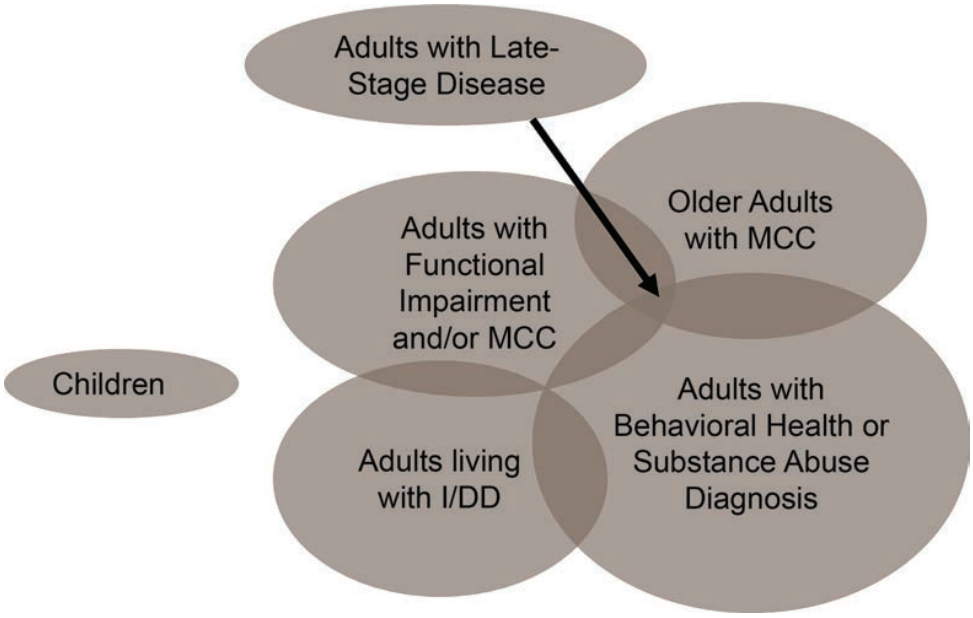
The 23 awardees in the complex/high-risk patient targeting portfolio take diverse approaches to innovation. They are united by the shared goals of improving quality of care and the health of populations, while lowering the per capita costs of care. While this third Annual Report presents a free-standing assessment of each awardee on its own merits, there are important, policy-relevant lessons to be drawn from comparisons across pairs or groups of awardees.

This chapter is divided into three sections, to address cross-awardee themes related to target populations served, workforce innovations, and sustaining and scaling innovation in the context of delivery system reform. In each section, we present selected findings in the context of a particular theme; more information about awardees, and supporting analyses, may be found in both the individual awardee chapter and in the technical appendices. All claims-based findings are estimates developed using summative difference-in-differences models that compare the experiences of beneficiaries enrolled in the HCIA-supported innovation with those of a matched group of comparators.

Populations

As noted earlier in the previous chapter, the complex/high-risk patient targeting portfolio of HCIA One awardees comprises a set of innovations that serve diverse, overlapping target groups, all of whom are medically complex and at higher-than-average risk for hospitalization. Medicare beneficiaries are represented across five of these six groups (all except for pediatric enrollees) and Medicaid beneficiaries across all six groups. See Exhibit 3.1 for a visual depiction of the six target groups and Appendix I Exhibit I.1 for a summary table that lists each awardee according to the population(s) served.

Exhibit 3.1: Populations Served by Complex/High-Risk Patient Targeting Awardees



I/DD: Intellectual and/or Developmental Disability
MCC: Multiple Chronic Conditions

In this section, we summarize key themes that emerge from serving these target populations, related to beneficiaries who are low-income (enrolled in Medicaid and/or dually eligible for Medicare), those living with late-stage illness, persons with a behavioral health or substance abuse diagnosis, and those aging with an intellectual and/or developmental disability (I/DD).

Medicaid and Dually Eligible Beneficiaries

Persons with MCC, particularly those that live in low- or moderate-income households, often struggle with a fundamental lack of access to appropriate, timely primary care for health maintenance and palliative care for the end of life. Many of the complex/high-risk awardee interventions improve access to care, as they test approaches to improve quality of care, reduce inappropriate utilization, and save Medicare and Medicaid dollars. Yet a recent Institute of Medicine report notes that

> *"…many of the most urgent needs…are not medical per se and require the design and implementation of affordable support service programs that rigorously target the highest-risk patients and families, and tailor services to specific family needs as they evolve over time. This approach, the essence of person-centeredness, is fundamental to achieving the efficiency goals of public financing programs."*[320]

[320] Institute of Medicine. *Dying in America. Improving Quality and Honoring Individual Preferences near the End of Life* (Washington, DC: The National Academies Press, 2014).

These needs are important to Medicare and Medicaid beneficiaries more generally, as acknowledged by CMMI's testing of the Accountable Health Communities model.[321] Addressing non-medical needs considers the impacts of social determinants of health, or what the World Health Organization describes as "the conditions in which people are born, grow, live, work and play."[322] Awardees that are committed to a person-directed approach to care planning address the needs that participants prioritize for food, transportation, affordable housing, income supports, as well as coordination with long-term services and supports; this is an important aspect of their innovative programs. Patients and families may not be aware of community resources and programs for which they qualify, so facilitation and navigation are important functions.

Program Models and Practices. Two common approaches to incorporating such referrals include the home visit and the co-location of community agencies at the awardee's sites of service.

- *Home visits* enable intervention staff to function as the eyes and ears of clinicians who are not in the home. Patients' homes are an important site for visits that combine care coordination, patient navigation, education or engagement, and referrals to community resources (JHU SON, Northland, PCCSB, Sutter Health, SCRF, U Iowa, U New Mexico). Reduction of social isolation is an additional, key feature of home visiting. For one awardee (JHU SON), the enrolled beneficiary's home is itself part of the clinical encounter, providing a way to improve a participant's day-to-day functioning and wellbeing.

> "There is so much social work in these visits. The marginalization is extensive. They need equipment and referrals, other community outreach. The average visit is a minimum of two hours up to four hours for everything…[I am] stunned with the social isolation. If they were not in a mildly supervised setting, their survival would be in question."
>
> –Staff Interview, PCCSB

- *Co-location* of community resources and supports with the intervention leverages a patient's time and efforts to participate in care, ideally, improving the efficiency of access to care. Examples for the CHRPT cohort include URI, which has located its Living RIte clinics at state developmental disabilities agencies, where there is proximity to jobs counseling and peer coaching; LifeLong, which allows intervention RN case managers to share quarters with peer health coaches from its intervention partner, the Center for Independent Living; and CKRI, which offers same-day appointments for care delivery and care coordination. In the case of CKRI, a patient who arrives at the HCIA-supported Advanced Primary Care Clinic for a provider appointment may also meet with a non-clinical Independent Living Skills worker during the same visit.

Workforce. While the role of social worker might seem the most appropriate for addressing social determinants, there is noteworthy variation in staffing by program model. Most commonly, nurses or other clinicians facilitate clients' receipt of social and other services (eight awardees), followed by CHWs or peer/lay health workers filling this role (six awardees), social worker (four awardees), or behavioral health specialists (two awardees).

- *Social workers* are commonly involved in addressing social determinants (BIDMC, J-CHiP, PPMC, Sutter Health). CCNC and UT Houston employ social workers for assessing needs (including home

[321] Alley DE, Asomugha CN, Conway PH, Sanghavi DM, "Accountable Health Communities –Addressing Social Needs through Medicare and Medicaid," *New England Journal of Medicine* 374 (2016): 8-11.

[322] World Health Organization, "What are social determinants of health?" At http://www.who.int/social_determinants/sdh_definition/en/ (accessed 12/29/2015).

visits) and making referrals, as well as advocating on behalf of families. For VUMC, social workers assist with placement and care planning, rather than addressing social determinants of health.

- *Community health workers* (CHWs) play this role for UEMS (where referrals are a significant aspect of the intervention, in supporting realization of goals set by patients), J-CHiP's community arm (as well as neighborhood navigators), and U New Mexico.
- For higher-acuity patients served by a sole care coordinator or smaller care teams, *nurses* may play this role (U Iowa, Northland, PCCSB). PRHI's Primary Care Resource Centers do not employ social workers, so nursing staff taps their host hospital's resources to connect patients with transportation and other needs. In the case of JHU SON, both team members (occupational therapist, RN) may make referrals as part of the care planning process, with improved housing safety addressed within the intervention by handyman services.
- LifeLong and CKRI both involve nurse care managers (RNs) and peers to link patients to community resources that may be needed to address mental illness, substance abuse, homelessness, food insecurity, lack of transportation, and other circumstances. Like LifeLong, U New Mexico targets the population of high-utilizing Medicaid beneficiaries, many of whom struggle with substance abuse or mental illness. The U New Mexico ECHO Care model uses CHWs, nurse practitioners, physician assistants and social workers as part of interdisciplinary Outpatient Intensivist Teams that deliver and coordinate care, at home and in clinic settings. As adapted by each of CNCC's embedded team in health care networks across the state of North Carolina, non-clinical patient coordinators or advocates serve a similar function as ECHO Care's CHWs, collaborating with their clinical team partners to assist parent caregivers in navigating health care and long-term care arrangements.

For low- or moderate-income medically complex populations, referrals for Meals on Wheels, transportation, affordable housing, and other community services comprise a critical and under-recognized aspect of care, similar to long-term services and supports in that these referrals enable Medicare-funded health services to be delivered efficiently and effectively. Transportation is the single most commonly-cited challenge. Such referrals, however, may not result in the provision of services, as social service programs and benefits have been underfunded in recent years. For example, spending for programs under the Older Americans Act has not increased in recent years, unlike spending for Medicare: "[S]ocial supports engender value, in part by improving clinical outcomes and reducing utilization for vulnerable patients…Care coordination, primary care geared toward chronic disease, and affordable supportive housing and transportation will be more important than even before."[323]

Two subgroups of awardees in the complex/high-risk portfolio have a particular commitment to addressing the social determinants of health: those targeting adult Medicaid enrollees, particularly in states that have had expansions under the Affordable Care Act (ACA); and those serving dually eligible beneficiaries (medically frail elders living in low-income households).[324]

[323] Parikh RB, Montgomery A, Lynn J. 2015. The Older Americans Act at 50 –Community-based care in a value-driven era. New England Journal of Medicine 373#5: 399-401.

[324] Elsewhere in this chapter, we consider theme-based findings for awardees that serve Medicaid beneficiaries living with intellectual and/or developmental disabilities (I/DD) and those with behavioral health or substance abuse diagnoses; policy-relevant findings for the two awardees (CCNC, UT Houston) that serve medically complex pediatric Medicaid beneficiaries, have been presented previously, in NORC's Second Annual Report to CMMI (2016).

Outcomes, Medicaid Expansion Populations. Under the ACA, 32 states (including the District of Columbia) have expanded their Medicaid programs[325] Within these states, five awardees (J-CHiP, LifeLong, PPMC, UEMS, U New Mexico) served over 60,000 Medicaid beneficiaries with multiple chronic conditions, delivering care to newly enrolled adults. Each awardee had to address the significant challenge of innovating to better serve a medically complex population with social needs, by successfully adapting its program to provide patients with the right care, at the right time. See Appendix I, Exhibit I.2 for a summary of claims-based findings, as follows, relative to an external comparison group:

- **Cost.**[326] Four of five awardees achieve statistically-significant reductions in average quarterly total cost of care (ranging from -$381 per beneficiary to -$4,987 per beneficiary-episode); cost data from claims were not available for LifeLong.
- **Utilization Measures.** For J-CHiP, there is an increase in average quarterly hospitalizations for the hospital arm and a decrease for the community arm; there are also decreases for LifeLong and PPMC's Emergency Department (ED) Guides intervention, and UEMS. ED visits decrease for four awardees (J-CHiP, both arms; LifeLong; PPMC's New Directions arm; and UEMS), while they increase for two other arms within PPMC, ED Guides and Standard Transitions.
- **Quality of Care.** There are two awardees for whom measures of practitioner follow-up visits can be estimated. J-CHiP's hospital arm shows average quarterly decreases in 7-day follow-up visits post-hospital discharge (-70 per 1,000 beneficiary-episodes) and 30-day follow-up visits post-discharge (-184 per 1,000 beneficiary-episodes). UEMS shows decreases in 90-day follow-up visits (-69 per 1,000 beneficiaries). These findings likely reflect the ongoing difficulty of securing timely access to primary care, and of ensuring that beneficiaries can attend appointments once scheduled, especially when follow-up appointments are not delivered as part of the HCIA-supported intervention.

Outcomes, Dually Eligible Beneficiaries. While our claims-based analysis does not permit full characterization of the extent to which dually eligible beneficiaries are targeted or served, we have analyzed data based on coverage status (as reported by awardees to CMMI), descriptive characteristics identified in claims using finder files provided by awardees, and site visits and interviews to identify a subgroup of awardees who target fully dually-eligible beneficiaries for enrollment.[327] See Appendix I, Exhibit I.3 for a summary of claims-based findings, as follows, relative to an external comparison group:

- **Cost.** Three awardees experienced average quarterly savings in the total cost of care of -$1,943 per beneficiary (CKRI, Medicaid); -$4,987 per beneficiary-episode (J-CHiP hospital arm, Medicaid); -$1,756 per beneficiary (J-CHiP community arm, Medicaid); and between -$381 and -$1,220 per beneficiary (PPMC, multiple arms). For CLTCEC, we observe cost reductions during the awardee's second year (-$1,522 per beneficiary). For six awardees, any impact on cost is not statistically significant.

Awardees Targeting Dually Eligible Beneficiaries

CLTCEC	Northland
CKRI	PCCSB
J-CHiP	PPMC
JHU SON	St. Francis
LifeLong	SCRF

[325] Kaiser Commission on Medicaid and the Uninsured, "Current Status of State Medicaid Expansion Decisions," At http://kff.org/health-reform/slide/current-status-of-the-medicaid-expansion-decision/, accessed 8.3.16.

[326] Costs are based on claims only and do not include the cost of the intervention itself.

[327] Dual eligibility is defined as full, rather than partial or a state optional population; for more background on dual eligibility, see Watts M.O., Cornachione E, Musumeci M, "Report. Medicaid Financial Eligibility for Seniors and People with Disabilities in 2015" Publication #8843 (The Kaiser Commission on Medicaid and the Uninsured, 2016).

- **Hospitalizations.** For J-CHiP's hospital arm, average quarterly hospitalizations increase by 53 per 1,000 beneficiary-episodes. Hospitalizations decrease for J-CHiP's community arm, LifeLong (over a two year time period), PPMC's ED Guides arm, and PCCSB.
- **ED Visits.** For three awardees, average quarterly ED visits decreased by between -24 and -150 per 1,000 beneficiaries (J-CHiP's community arm, LifeLong, PCCSB) and by -134 visits per 1,000 beneficiary-episodes (J-CHiP's hospital arm). For two awardees, average quarterly ED visits increased, by 23 per 1,000 beneficiaries (Northland), 60 per 1,000 beneficiaries (PPMC's ED Guides arm), and 154 per 1,000 beneficiaries (PPMC's Standard Transitions arm).

For one awardee (J-CHiP), the large size of our analytic samples allows a comparison of the experience of dually eligible and non-dually eligible Medicaid beneficiaries, across both hospital and community arms. This comparison considers two claims-based measures estimated using Medicaid claims (total cost of care and ED visits); see Appendix I Exhibits I.4 for a table of findings, as follows:

- **Hospital Arm:** Statistically significant savings in the 90-day total cost of care for all Medicaid beneficiary-episodes (-$4,987 per beneficiary-episode per quarter) is driven by greater savings for those enrolled in Medicaid only (-$7,954 per beneficiary-episode) relative to beneficiaries who are dually eligible (-$2,730 per beneficiary-episode). Similarly, the overall decrease in ED visits for all Medicaid beneficiary-episodes (-134 per 1,000 beneficiary-episodes per quarter) is greater for those that are Medicaid only (-153 per 1,000 beneficiary-episodes per quarter) than for those who are dually eligible (-86 per 1,000 beneficiary-episodes per quarter). The positive impact of J-CHiP's hospital arm remains significant but attenuated for dually-eligible beneficiary-episodes, likely reflecting the greater difficulty of addressing the higher acuity and more complex social risk factors of older adults in low-income households.
- **Community Arm:** Statistically significant savings in the total cost of care for all Medicaid beneficiaries (-$1,756 per beneficiary per quarter) are greater for those enrolled only in Medicaid (-$1,621 per beneficiary per quarter), compared with those who are dually eligible (-$1,041 per beneficiary per quarter). In contrast, the overall decrease in ED visits for all Medicaid beneficiaries (-48 visits per 1,000 beneficiaries per quarter) is greater for dually eligible beneficiaries (-56 visits per 1,000 beneficiaries per quarter), relative to Medicaid only enrollees (-44 visits per 1,000 beneficiaries per quarter). The positive impact of J-CHiP's community arm is significant but attenuated for dually eligible beneficiaries, while the overall reduction in ED visits is higher for dually eligible beneficiaries. These findings reinforce the challenge of achieving cost savings for higher-acuity elders in low-income households and the promise of the intervention's community-based strategies specifically for lowering ED visits by dually eligible beneficiaries.

Summary. A number of complex/high-risk awardees serve Medicaid and dually eligible populations, with two common program models being home visits and the co-location of staff who make referrals to community benefits and supports. Staffing varies from awardee to awardee and can involve nurses and social workers, as well as lay health workers. For low- or moderate-income medically complex populations, referrals for Meals on Wheels, transportation, affordable housing, and other community services comprise a critical and under-recognized aspect of care, similar to long-term services and supports in that these referrals enable Medicare-funded health services to be delivered efficiently and effectively. Sub-analyses for awardees that serve Medicaid expansion populations and those targeting dually eligible beneficiaries find statistically significant cost savings for many awardees, with mixed

findings on utilization and quality of care. Comparing the claims experience of dually eligible and non-dually eligible Medicaid beneficiaries, we find that cost savings are attenuated for duals, likely reflecting the greater difficulty of addressing the higher acuity and more complex social risk factors of older beneficiaries in low-income households.

Beneficiaries Living With Late-Stage Illness

For high-risk beneficiaries, the diagnosis of a serious, potentially life-limiting condition adds another layer of complexity to the care planning process, especially if a provider anticipates the end of life within a year's time. Advance care planning (ACP) brings a specific set of tools and objectives to care planning, to accomplish the goals and priorities for care that the patient and family have articulated. In many instances these preferences include more supportive and palliative care, often delivered in the patient's home. As a result, successful ACP can be expected to positively affect our evaluation's measures of program effectiveness, as well as facilitating family decision-making.

Advance Care Planning. Discussion of end-of-life care, can include preparation of advance directive and medical orders.
Advance Directive. Includes either or both a living will and a durable power of attorney for health care.
Physician Orders for Life-Sustaining Treatment (POLST). State-authorized medical orders signed by a clinician, may vary by state.

Source: Institute of Medicine, 2014. See Appendix I, Exhibit I.5 for a complete set of definitions.

Program Models and Practices. Best practices in ACP emphasize the value of beginning related conversations in early adulthood, with updates throughout the lifespan as health and functioning change. However, in the context of the complex/high-risk evaluation portfolio, ACP typically occurs within the context of late-stage illness or significantly impaired function. Complex/high-risk awardees take a variety of approaches to ACP as part of their HCIA-supported innovations (J-CHiP, Northland, PCCSB, Sutter Health, U North Texas, VUMC, SCRF). Given the serious illness faced by participants served across the CHRPT portfolio, one might have expected ACP to play a larger part in many of these interventions. Yet, neither intervention focused on training in-home paid caregivers includes substantial curricular attention to ACP (CLTCEC, UAMS) nor prepares caregivers for the loss of their patient. Likewise, neither intervention targeting medically complex children has an ACP component.

The intended dosage or timeframe for intervention influences the nature of ACP. Shorter term transition of care interventions (J-CHiP, VUMC) or those with a care planning focus (SCRF) offer one-time creation or updating of an advance directive, while longer-term patient and caregiver engagement creates opportunities for periodic conversations and updating of advance directives and more comprehensive ACP (Sutter Health, PCCSB, Northland, U North Texas). Several awardees address ACP, or advance directives specifically, as part of transitions of care, particularly between hospital and SNF.[328]

[328] Under the 1990 Patient Self-Determination Act, Medicare's conditions of participation for long term care facilities require such facilities, including SNFs, to (1) have policies and procedures regarding the right of residents to formulate advance directives, refuse medical and other related interventions; (2) inform and educate the resident about these rights; and (3) determine whether the resident has an advance directive in place or offer the resident the opportunity to develop an advance directive. See 42 CFR 483.10 (b) (8), and State Operations Manual Appendix PP - Guidance to Surveyors for Long Term Care Facilities *(Rev. 149, 10-09-15)* at https://www.cms.gov/Regulations-and-Guidance/Guidance/Manuals/downloads/som107ap_pp_guidelines_ltcf.pdf

Two awardees identify part of their value as caring for patients who may qualify for hospice services in the near future, where the intervention may enable or bridge a transition to hospice (PCCSB, Sutter Health). Others, such as U New Mexico and PPMC, find that some of their most gravely ill patients are best served with palliative interventions from a care team that knows them well. A larger issue is that medically frail persons who might benefit from palliative services are not certain to receive them, either because of a dearth of local palliative care physicians, or because they might not be deemed eligible for hospice services, which are limited to persons determined to be terminally ill. (Medicare limits hospice services to those not expected to live more than six months.) Persons living with MCC and frailty often have a persistently ambiguous prognosis for survival until they are very close to death.

Approaches to ACP vary by model:

- **Transitional Care Models.** A hospitalization or stay in skilled nursing (SNF) offers the chance for providers to educate and engage patients and their families in ACP discussions. Four awardees (J-CHiP, PPMC's C-TRAIN intervention arm, U North Texas, VUMC) introduce ACP and advance directives in the context of a transition in the site of care, typically from hospital to SNF or home health services. In the case of U North Texas, implementation partner Brookdale Senior Living presents information about (and help with) ACP within its independent living, assisted living, and memory care residences. While hospitals and even SNFs can be challenged to undertake ACP in a thoughtful way by the seriousness of the patient's illness and brevity of stay, congregate living facilities can broach the topic in a series of meetings and discussions that take place over time, normalizing the topic and involving family members at a more stable point in the resident's life.
- **Community-based Models.** Three CHRPT awardees (PCCSB, Sutter Health, SCRF) deliver ACP as part of interventions intended to keep medically frail beneficiaries in their homes by avoiding otherwise preventable ED visits and hospitalizations. For PCCSB, improving access to care for medically frail beneficiaries includes raising awareness about ACP. Sutter Health's model, like that of U North Texas described above, emphasizes ACP as an ongoing process, rather than a one-time conversation, and trains its intervention staff intensively to build competency in facilitating ACP conversations and educating patients and caregivers about options; Sutter Health offers a promising ACP model for a health system, where communication with patients and providers across care settings and over time may deliver savings in end-of-life care. The importance of training is underscored by the negative experience of SCRF staff with ACP and the stress reported by SCRF staff in the face of the deaths of enrollees; project leadership noted that staff may feel uncomfortable or ill-prepared to facilitate an ACP discussion, and staff identified the need for more effective training in this area, given the frailty of the target group served.

Workforce. Staffing and training for those interventions that focus on ACP as a key component of their HCIA-funded intervention are crucial. Hiring staff with previous experience in hospice care (where RNs are involved in ACP conversations), and training intervention staff in communication techniques and end-of-life planning, are critical to the success of ACP. For example, Sutter Health leadership report that they prefer to hire staff members with hospice experience because of their proven ability to facilitate difficult conversations and ACP. Physicians are tasked with ACP and the signing of medical orders (POLST), although they may not have the training or practice in initiating discussions related to end-of-life planning

and care.[329] Two awardees (U New Mexico, Sutter Health) include physicians in ACP training. Other awardees use clinicians other than MDs, including nurses and social workers, to facilitate these conversations (PCCSB, U North Texas, VUMC).

Exogenous Factors Related to Innovation. We find three meaningful exogenous factors for ACP, including state regulations around care planning, access to hospice or palliative care services for Medicaid beneficiaries, and the role of family and participant beliefs about the end of life.

- *State and federal regulations.* Some awardees work within the rules that pertain to care planning by state Medicaid managed care health plans (LifeLong, U New Mexico). Others are implementing in states where a legally recognized POLST exists (California, New Mexico, Texas, Tennessee), offering an infrastructure of partners that support ACP as part of the intervention and to which awardees can refer enrollees for more information.[330] All providers and facilities reimbursed under Medicare and Medicaid must also follow the federal Patient Self-Determination Act (1990) and accompanying regulations, which require that written policies and procedures be in place regarding advance directives, that a patient's execution of an advance directive be clearly documented in the medical record, and that education and outreach be conducted to promote the value of having an advance directive. Starting in 2016, CMS has begun reimbursement for in-person ACP with a physician, anticipated by awardees as a future revenue source to support this activity.
- *Palliative care outside of hospice.* Certain patients of HCIA awardees targeting high-acuity Medicaid beneficiaries, such as U New Mexico, have been in the very late stages of illness that are complicated by behavioral health problems. The awardee had not anticipated the care coordination and intensity of services needed by patients close to the end of life, nor the need to provide palliative care. Nonetheless, the awardee's Outpatient Intensivist Teams (OIT) aim to provide palliative care as appropriate, and U New Mexico palliative care specialists consult with OIT staff as part of ECHO Care's weekly Complex Care Clinic teleconference.
- *Family involvement in ACP.* Awardee clinical staff (SCRF, Sutter Health, U North Texas) has described experiences where families, rather than clients, become the deciding factors in care planning. More generally, a recent survey of clinicians (nurses, internal medicine residents, staff physicians) at 13 academic medical center hospitals shows that providers see family dynamics and a patient's lack of acknowledgement or understanding about their own prognosis (and the implications of decisions regarding care to extend life) as more significant obstacles to ACP than a provider's preparation or skill in facilitating discussion about end-of-life care.[331]

Outcomes. Our claims-based estimates of outcomes (program effectiveness) show statistically significant cost savings for five awardees and a mixed set of utilization outcomes; however, characterizing the

[329][329] Institute of Medicine. Dying in America. Improving Quality and Honoring Individual Preferences Near the End of Life (Washington, DC: National Academies Press, 2014): Hammes BJ, editor, Having Your Own Say. Getting the Right Care When It Matters Most (Washington, DC: CHT Press, 2012).

[330] As of December 2015, only five states did not have a legally recognized mechanism for such medical orders, at least under development if not fully implemented. See the National POLST Paradigm website for more information, at http://www.polst.org/ .

[331] You JJ, Downar J, Fowler RA, Lamontagne F et al. 2015. Barriers to goals of care discussions with seriously ill hospitalized patients and their families. A multicenter survey of clinicians. JAMA Internal Medicine 175#4: 549-556.

specific contribution of ACP to these impacts will require further analysis.[332] Appendix I, Exhibit I.8 presents a summary of related findings, as follows:

- **Cost:** There are statistically significant cost savings for J-CHiP, PPMC's C-TRAIN arm, Sutter Health, U New Mexico, and all three arms of the U North Texas intervention.
- **Utilization Measures:** We find a statistically significant increase in hospitalizations for J-CHiP, which may reflect improved access to care for the low-income beneficiaries targeted by this awardee; and statistically significant decreases in hospitalization for PCCSB, Sutter Health, and U North Texas, most of whose enrollees are Medicare beneficiaries not dually eligible for Medicaid. We also find a statistically significant increase in ED visits for Northland and for Sutter Health, which for Sutter may reflect the high acuity and late-stage disease of enrollees. There are significant decreases in ED visits for J-CHiP (using Medicaid claims), PCCSB, PRHI, and VUMC. There are significantly fewer 30-day hospital readmissions for U North Texas's assisted living/memory care arm; U North Texas also has fewer ambulatory care-sensitive hospitalizations.
- **Quality of Care Measures:** We find a statistically significant increase in practitioner follow-up visits for BIDMC (30-days post-discharge) and PRHI (7-days and 30-days post-discharge) but decreases for J-CHiP (7-days and 30-days post-discharge, using Medicare claims).

Our assessment also compares awardee models against benchmarks for best practices in communication, which is central to ACP, and for delivering ACP overall, as outline in the Institute of Medicine's recent report on end-of-life care (2014); see Appendix I, Exhibits I.3 (Communication) and I.4 (Best Practices).

- *Communication.*[333] The most common practices seen across the cohort include identification of high-risk patients (nine awardees) and improved communication of information across providers and care settings (eight awardees). Eight awardees provide education for patients and families, although only four use a checklist, conversation guide, or patient decision supports (e.g., worksheets, handouts with summary information about care options, such as ventilation). Seven awardees focus on initiating conversations for beneficiaries prior to a crisis or after hospital discharge. Six awardees include an intervention component to train staff on ACP, and five measure and report performance specifically related to ACP.
- *Best Practices.* The most common ACP component is the initiation or facilitation of conversations about advance directives either by clinical or non-clinical staff (ten awardees), followed by the updating of ACP preferences on an ongoing basis (six). Five awardees include the creation of medical orders (POLST or other, according to state regulations), and four specifically focus on the objective of having each enrollee designate a health care surrogate. Only three awardees include an emphasis on making advance directives accessible within electronic health records, for example, by flagging or making them an active part of an EHR, or by making the AD fields shared across HIT platforms. Three awardees take a more systematic, contextual approach to involvement in ACP by including outreach to community partners--for example, in PCCSB's outreach coordinator's involvement as a POLST educator within Santa Barbara.

[332] See Appendix I, Exhibit I.3 for the set of findings for these awardees that reach statistical significance; the full set of estimates for each awardee can be found in the respective awardee chapter.

[333] Based on "A Systematic Approach to Discussion of Serious Illness Care Goals," in Bernacki RE, and Block SD. 2014. Communication about serious illness care goals. A review and synthesis of best practices. JAMA Internal Medicine 174#12: 1994-2003.

Summary. In the context of the complex/high-risk evaluation portfolio, ACP typically occurs within the context of late-stage illness or significantly impaired function. Complex/high-risk awardees take a variety of approaches to ACP as part of their HCIA-supported innovations. The intended dosage or timeframe for intervention influences the nature of ACP. Shorter- term transition of care interventions (J-CHiP, VUMC) or those with a care planning focus (SCRF) offer one-time creation or updating of an advance directive, while longer-term patient and caregiver engagement creates opportunities for periodic conversations and updating of advance directives and more comprehensive ACP (Sutter Health, PCCSB, Northland, U North Texas). Hiring staff with previous experience in hospice care (where RNs are involved in ACP conversations) and training intervention staff in communication techniques and end-of-life planning, are described by awardees as critical to successful ACP. Three exogenous factors are influential in ACP: state regulations around care planning, access to hospice or palliative care services for Medicaid beneficiaries, and family and participant beliefs about the end of life. Our claims-based estimates of outcomes (program effectiveness) show statistically significant cost savings for five of nine awardees that include ACP as a meaningful part of their respective innovations, and a mixed set of utilization outcomes.

Beneficiaries with a Behavioral Health and/or Substance Abuse Diagnosis

While some awardees assisted individuals with behavioral health or substance abuse needs indirectly, five awardees (CKRI, LifeLong, J-CHiP, PPMC, U New Mexico) explicitly included intervention components that focus on individuals with these needs.

Beneficiaries targeted by these five awardees include: low-income urban patients, new adult Medicaid enrollees, and high health service utilizers; one awardee (CKRI) targeted patients with traumatic brain injury. Many of these patients fall under multiple categories, since new adult Medicaid enrollees often qualify for insurance due to low-income or disability, and may also be high ED utilizers. This high-needs population is often marginalized and overlooked because it is difficult to engage in primary care and patient education and incurs high health care expenditures as a result of frequent ED visits or hospitalizations. Individuals targeted by these awardees often face substantial unmet social service needs, including: unstable housing, lack of social network supports, challenges regularly taking their medications, and a lack of access to behavioral health or substance abuse treatment services.

Program Models and Practices. Intervention components often include integration of primary and mental health care by coordinating care among providers, or co-location of primary and mental health care providers, as well as establishing a primary care provider for the beneficiary. Patient engagement and care management directed at helping enrollees seek primary care were also central to the interventions. In addition, J-CHiP and PPMC helped patients receive priority appointments with a psychiatrist and/or substance abuse services, since access to timely mental health and substance abuse services is often a high need among this population.

Workforce. First, awardees focused on establishing unique staffing roles to serve this population by creating positions for non-clinical CHWs who can focus on engaging and building trust with beneficiaries. Awardees also tapped behavioral health specialists or counselors who can focus on providing treatment services. J-CHiP, for example, created roles for both community health workers and behavioral health specialists in community clinics; they can advocate for and support patients with behavioral health and substance abuse needs who are being guided towards primary care services.

Awardees also hired a mix of staff with experience working with individuals with mental health needs, including staff from the same neighborhoods as the population they target. At the same time, PPMC, understanding that this population often has complex psycho-social needs, found that staff with a greater level of education (licensed clinical social workers) were better equipped to assist populations with higher needs. Peer workers or peer coaches—individuals with similar conditions and circumstances to patients and who act as mentors and provide guidance to patients—have also been important resources for engaging individuals with mental health or substance abuse needs.

Training staff to work with this population is also important to ensure that the workforce is equipped to effectively provide services to the target population. While staff trainings varied widely across awardees, trainings especially important for working with individuals with mental health or substance abuse needs included trauma-informed care (TIC), used at PPMC, and motivational interviewing used at LifeLong, J-CHiP, U New Mexico and PPMC. TIC emphasizes the importance of "meeting patients where they are" and building relationships with patients over a longer period of time. PPMC used the theory and practice behind TIC to inform its approach to understanding and working with the behavioral health/substance abuse patient population. Motivational interviewing, a method of engaging with patients, helps elicit patient activation in care planning and education and encourages patients to take steps to improve their health and wellbeing. During site visits, staff highlighted the importance of these two trainings, with PPMC staff noting: "Before [the TIC training]…If they [patients] have a mental health diagnosis, we never talked about how to help patients going through a traumatic event…Now, with the training that we have received, it's like night and day."

Outcomes. The five awardees focused on providing care to individuals with behavioral health or substance abuse needs have shown success based on claims analyses, survey findings and focus group interviews with intervention participants. Compared to similar patients who did not receive the intervention, the total cost of care and/or health care utilization in terms of hospitalizations, hospital readmissions or ED visits, significantly decreased for those that received the intervention; see Appendix Exhibit I.9 for a table of statistically significant findings.

- *Cost:* Average quarterly savings range from -$381 to -$2,044 per beneficiary per quarter and -$4,987 per beneficiary-episode per quarter, for the four awardees where cost data are available. Each of the five arms of PPMC shows cost savings.
- *Utilization Measures:* Decreases in hospitalizations are seen for three awardees, ranging from 15 to 148 fewer hospitalizations per 1,000 beneficiaries per quarter, although for J-CHiP, decreases in hospitalizations for the community arm contrast with increased hospitalizations for the hospital arm, estimated with either Medicare and Medicaid claims. Findings are also mixed for ED visits, with decreases of between -16 and -162 ED visits per 1,000 beneficiaries per quarter and findings of both increases and decreases for separate arms within a single intervention (PPMC). Findings on 30-day hospital readmissions are significant for one awardee (J-CHiP), with increases seen for the hospital arm and a decrease for the community arm.

These claims analyses were not limited to those with mental health or substance abuse needs. Yet, given the high proportion of intervention participants with mental health and/or substance abuse needs among these five awardees, the results show that awardees were successful in reducing unnecessary use of high cost health care services such as ED services for the targeted patient population.

Patient survey and focus group data from four awardees (these data were not collected from PPMC) also show that intervention participants reported improved access to care and positive experiences with the intervention. While we are unable to distinguish intervention responses between those with and without behavioral health or substance abuse needs and few survey questions asked about receipt of these services, a review of the patient satisfaction data show that most participants were satisfied with their care experience. Respondents noted that their care managers or case workers were easy to contact when needed, listened carefully and helped connect them to social service supports. As reported in J-CHiP's chapter, their survey included questions related to behavioral health and close to three-quarters reported that staff asked them questions about their mental health. Participants at CKRI, LifeLong and U New Mexico revealed in focus groups that they especially appreciated the ease with which they could contact intervention staff when needed and the staff's help with scheduling appointments and connecting them to social service supports.

> "[The HCIA program has] been incredibly helpful. I fled my house, I was applying for places and nothing was organized. Trying to live in my car and deal with this is impossible. I have cognitive issues...It has been encouraging and nonjudgmental… They have helped tremendously. Being able to go through [nurse care manager] for medications. It's a fill in for who I can call. And it's been nurturing. It makes me feel better about myself."
>
> -U New Mexico Participant

Best Practices and Lessons Learned. Discussions with project staff during site visits and phone calls revealed several best practices and lessons learned from working with patients with high behavioral health and substance abuse needs. Awardees discussed the importance of hiring the right staff to work with this complex patient population. PPMC leadership described the right staff member as "Switzerland-like;" that is, he/she should be able to understand people's various languages quickly and work to be an advocate for their patients, but also be able to back off to a less-involved position if patients' issues begin to overwhelm them.

Program staff acknowledged the importance of taking time to build trust with patients experiencing substantial behavioral health issues. Awardees noted that it could take months to slowly build trust with a patient and that communicating on their terms—including text messaging between program staff and patients—could be a helpful mode of communication. Staff pointed out that the first step in working with this patient population, many of whom have historically distrusted doctors, is helping them appropriately engage with the health care system and meet with primary care providers. Case managers' and CHWs' ability to build relationships with patients and attend appointments with them were instrumental to patients re-engaging with the health care system.

> "Sometimes [patients] don't tell you that they're homeless. It really depends on the individual and how they open up to their case workers. They will tell the case worker they need so much, but they don't follow through. We eventually become friends, because they call you, and they will then trust you and you find out they need a lot more."
>
> –J-CHiP Team Member

Patients with mental health and/or substance abuse needs often have social support needs, such as unstable housing or unsafe living environments, lack of reliable transportation, and food shortages. All awardee programs referred intervention participants to community resources to help address these social determinants of health and both staff and participants alike reported that these supports were an important component of addressing patient health needs. Care managers or CHWs in these programs often act as problem-solvers for patients; they help patients figure out solutions to challenging circumstances, make referrals where appropriate, and coordinate with other providers.

> "It's a group effort—me, the doctor, social worker and community health worker. They ask where I want to be a few months from now or a year from now. I can get to where I was before or at least close. They work on it with you and check in at each time you come in. If something is not working, we will try something else."
>
> –U New Mexico Patient

Along with providing social service supports, awardees (CKRI, LifeLong and PPMC) find benefit from establishing relationships between patients and peer coaches or peer workers. Allowing patients to learn from a peer who has overcome similarly challenging circumstances and who can provide guidance and support having overcome similarly challenging circumstances, was very helpful.

Awardees (PPMC and J-CHiP) note that while they helped patients obtain priority access to psychologists and psychiatrists as part of the intervention, there were also challenges to ensuring timely access to mental health care staff. Program staff at PPMC, in particular, noted that the demand for mental health care and substance abuse services in the Portland area is high; psychiatrists and psychologists struggle at times to meet patient demand in a timely manner, and patients often experience delays in receiving treatment. On a related topic, awardees noted that billing for psychiatric services can be a challenge, including billing for psychiatric consulting services in primary care clinics (J-CHiP). Awardees also reported that finding appropriate referral services for patients, especially affordable housing for patients in Portland and consistent transportation to doctor appointments for patients during Minnesota winters, can pose a challenge.

Summary. Five awardees explicitly included intervention components that focus on individuals with behavioral health and/or substance abuse diagnoses. Members of this high-needs population are often marginalized and overlooked because engaging them in primary care and patient education is difficult and they incur high health care expenditures as a result of frequent visits to the ED or hospitalizations. Individuals targeted by these awardees often face substantial unmet social service needs, including: unstable housing, lack of social network supports, challenges regularly taking their medications, and a lack of access to behavioral health or substance abuse treatment services. Intervention components can include integration of primary and mental health care by coordinating care among providers, or co-location of primary and mental health care providers, as well as establishing a primary care provider for the patient. Program models feature lay health workers and a focus on training, particularly TIC and motivational interviewing with clients. Awardees have demonstrated success in achieving cost savings, with mixed utilization findings. Lessons learned for serving this population include the importance of hiring skilled staff who can be responsive to clients and are empowered to take the necessary time to build trust with their patients. In addition, all awardee programs referred intervention participants to community resources to help address these social determinants of health. Both staff and participants reported that these supports were an important component of addressing patient health needs.

Beneficiaries Living With an Intellectual and/or Developmental Disability

Two awardees –DDHS and URI –target their interventions to persons living with an intellectual and/or developmental disability (I/DD), including those enrolled in Medicaid and persons who are dually eligible for Medicaid and Medicare. This group historically received health care and long-term services and supports (LTSS) in fee-for-service Medicaid with very little care coordination or integration of acute, LTSS, and behavioral health services. There have been some small-scale efforts to establish patient-centered medical homes (PCMH) in states such as New Jersey, Rhode Island, and North Carolina.[334] Under the Patient Protection and Affordable Care Act (ACA), health homes were created to expand the medical home model within Medicaid to individuals with complex needs, including multiple chronic conditions and behavioral health needs. While none of the 21 approved state plans specifically target individuals with I/DD, five states mention individuals with I/DD and others may be touching segments of the population. Until very recently, individuals with I/DD have been "carved out" of movements within states towards Medicaid managed long-term services and supports (MLTSS). A handful of states have a long history serving this population in managed care.[335] Models vary greatly across states in terms of scope, integration of services, and financing.[336] In the near future, the Centers for Medicare & Medicaid Services (CMS) plans to initiate additional demonstrations that will expand the PACE program to younger individuals with disabilities, including individuals with I/DD.

A better understanding of the factors driving ED visits and hospitalizations is first needed in order to target effective efforts to reduce these incidents. There is evidence that continuity of care, an essential element of care coordination, can contribute to overall reductions for the I/DD population.[337] While individuals with I/DD are sometimes viewed as high utilizers of health care, there are significant disparities and underutilization of routine, preventive care. This complicates measures of health care utilization and costs. For individuals with I/DD, some increased utilization may be needed up front in order to achieve savings over time as individuals with disabilities age.

Program Models and Practices. While DDHS organizes its intervention around a medical home, URI emphasizes care coordination in a community setting.

- *DDHS.* Mental health services (behavioral and psychiatric) are coordinated with primary care and some specialty medical care, such as neurology. Awardee leadership has a long-standing history with the target population and program model, having first implemented the program—known as "the Morristown model"—in 1982 within a community hospital.[338] Prior to receiving the HCIA 1 funding, DDHS provided integrated care services at two independent, community-integrated physician offices in New Jersey, serving approximately 500 patients. HCIA support enabled DDHS to expand what it

[334] Lind, A. and Archibald, N. (2013). *Structuring new service delivery models for individuals with intellectual and developmental disabilities.* Hamilton, NJ: Center for Health Care Strategies.

[335] Caldwell, J. and Patterson, R. (2013). *Report to the President on Managed Long-Term Services and Supports.* Washington, DC: President's Committee for People with Intellectual Disabilities, U.S. Department of Health and Human Services.

[336] National Association of States United for Aging and Disabilities (2016). *State Medicaid integration tracker.* Washington, DC: NASUAD.

[337] Wood, D., Hall, A., Hou, T., Wludyka, P., and Zhang, J. (2007). Continuity of care to prevent emergency room use among persons with intellectual and developmental disabilities. *Journal of Policy and Practice in Intellectual Disabilities, 4(4),* 219–228.

[338] Ziring, P.R., Kastner, T.A., Friedman, D.L., et al. 1988. Provision of health care for persons with developmental disabilities living in the community. The Morristown model. *Journal of the American Medical Association* 260(10):1439-44.

calls its developmental disabilities health home model, which provides integrated primary care, mental health, and specialty medical care services through care teams made up of nurse practitioners (NPs) and physicians, to six clinic sites—four in New Jersey and two in New York.

- *URI.* The awardee has implemented an entirely new model that offers clinic-, home-, and community-based access to primary care, integrated with patient empowerment, social services referrals, and employment services. Awardee leadership manages the staffing, outreach, and general program management aspects of the intervention, while two state developmental disability organizations (DDO), Seven Hills and AccessPoint RI, each operate a Living RIte Center, a collaborative medical home, where a primary care clinic is collocated with social services and referrals to peer educators, skills workshops, and community services and supports.

Workforce. Both awardees employ nurse practitioners (NPs) to lead team-based care. The DDHS model uses NPs as team leaders, managing and providing most patient care as well as case management and care coordination, and a physician trained in psychiatry with specialized medication knowledge and experience working with individuals with I/DD. The physician's role is to be available for consultations or more complex decisions. In order to avoid agitating patients with I/DD, the entire staff works to provide patient-centered office visits with little to no wait for patients. Formal training is limited but includes an introduction to a specialized set of primary care practice guidelines on I/DD; most NPs were hired already having substantial experience with this target population and having learned through on-the-job experience. URI brings together a range of clinical and non-clinical team members, with a NP shared between two Living RIte Centers; an interdisciplinary team of primary, specialty, and consulting professionals (e.g., dieticians, occupational therapists, clinical pharmacists); and peer specialists and life coaches who provide one-on-one counseling and teach health and wellness classes.

Factors Related to Innovation. The prospective impact of HCIA-funded programs is likely to be moderated by several important contextual factors, including a beneficiary's residential setting, the likelihood that beneficiaries experience health disparities, and the heterogeneous nature of the population.

- **Residential Setting.** Most individuals with I/DD reside at home with family caregivers.[339] Care coordination may look very different depending on residential setting. For example, individuals residing in group homes or Intermediate Care Facilities for Individuals with Intellectual Disabilities typically have case managers or supervisor-level staff that on some level interact with the health system as "de facto" care coordinators. For individuals residing at home, a family caregiver or direct support staff is typically the central point of contact and coordinates with the health system. This context is particularly important because individuals with I/DD often have difficulties with communication, understanding, and processing information. It is essential for family caregivers, direct care workers, and other supports to be integrated into the care coordination team.

[339] Larson, S.A., Faykin, F., Muchow-Hallis, L., Pettingel, S., Taylor, B., Hewitt, A., Sowers, M., Fay, M.L. (2015). *In-Home and Residential Long-Term Supports and Services for People with Intellectual or Developmental Disabilities: Status and Trends through 2013.* Minneapolis: University of Minnesota, Institute on Community Integration, Residential Information Systems Project.

- **Health Disparities.** Second, individuals with I/DD experience significant health disparities that can benefit from care coordination.[340] Individuals with I/DD are less likely to receive preventive care such as routine screenings for breast, cervical, and prostate cancer. They are less likely to receive routine influenza and other immunizations. They face significant barriers to receiving routine dental care. Individuals with I/DD are at risk for overuse of psychotropic medications and adverse effects from drug interactions. They often do not have access to community-based behavioral supports. Individuals with I/DD face high rates of obesity and low rates of physical activity. Many individuals with disabilities do not have access to evidence-based programs to self-manage chronic conditions, promote healthy lifestyles, and prevent the development of secondary conditions.
- **Heterogeneity of I/DD Population.** Care coordination will likely be most effective when targeted to needs of specific groups of individuals with I/DD. For example, this might include individuals with behavioral health needs, individuals with multiple chronic conditions, or individuals with specific conditions, such as Down syndrome, epilepsy, or cerebral palsy. Care coordination might also be targeted to individuals aging with I/DD. Individuals may also face condition-specific age related declines, such as increased prevalence of early-onset Alzheimer's among adults with Down syndrome.

Outcomes. Statistically significant changes, relative to a matched comparison group, are limited for both awardees. For DDHS, there are 57 fewer ED visits per 1,000 beneficiaries per quarter (estimated using Medicaid data), and no other findings based on Medicaid or Medicare claims reach statistical significance. The Medicaid findings are for beneficiaries served in New York only, as data were not available for New Jersey enrollees. For URI, our analysis estimates $2,360 in added Medicare costs per beneficiary per quarter and no other statistically significant changes in utilization or quality of care. Given the complex nature of care coordination for this population, these findings are not a surprise. It is likely URI participants are receiving needed care as a result of the program. Our ability to use claims data to detect impacts may be limited by the relatively short HCIA One innovation performance period; a longer timeframe of five to ten years may be better suited to identifying changes in outcomes.

Despite the modest impact estimated using claims data, both DDHS and URI receive high marks for patient satisfaction. In particular, our analysis of DDHS's internal survey data (n=182, collected from September 2014 through June 2015) finds that most respondents (beneficiaries or their proxies) note improved access to care, care delivery, and improved management of their health since enrolling in the DDHS intervention. More than three-quarters of respondents find the facility easy to get to, 98 percent rate quality of the experience as above average or excellent, and 71 percent believe their health has improved during the last year. Nearly all respondents (99 percent) report that program staff work cooperatively to solve their health issues. In addition, a majority of respondents (85 percent) also report

[340] Drum, C., McClain, M.R., Horner-Johnson, W., & Taitano, G., (2011). *Health disparities chart book on disability and racial and ethnic status in the United States.* Durham, NH: Institute on Disability, University of New Hampshire; Havercamp, S.M., Scandlin, D. and Roth, M. (2004). Health disparities among adults with developmental disabilities, adults with other disabilities, and adults not reporting disability in North Carolina. *Public Health Reports, 119*, 418-426; Krahn, G., Hammond, L., & Turner, A. (2006). A cascade of disparities: Health and health care access for people with intellectual disabilities. *Mental Retardation and Developmental Disabilities Research Reviews, 12*, 70-82; Office of the Surgeon General (2002). *Closing the gap: A national blueprint to improve the health of persons with mental retardation.* Washington, DC: Office of the Surgeon General, U.S. Department of Health and Human Services. Office of the Surgeon General (2005). *The Surgeon General's call to action to improve the health and wellness of persons with disabilities.* Washington, DC: Office of the Surgeon General, U.S. Department of Health and Human Services.

feeling more confident in managing their own health and having fewer problems with their medications (90 percent).

Payment environments for DDHS and URI differ markedly, but both underscore the key role of capitation. The lack of capitated Medicaid health plan contracting in New Jersey presented a significant obstacle to implementation and sustainability for the DDHS innovation, while the option for capitation enabled success at DDHS's New York sites. In contrast, the launch of Rhode Island's financial alignment demonstration for dually eligible beneficiaries nearly derailed the URI innovation, under a common misperception that beneficiaries enrolled in the demonstration could not participate in the Living RIte Centers. Sustainability plans hinged on URI's ability to become a vendor to the Neighborhood Health Plan, Rhode Island's Medicaid managed care plan serving beneficiaries living with I/DD.

Summary. Our findings point to the value of care coordination for beneficiaries living with I/DD and the importance of capitated funding to enable providers to meet the needs of beneficiaries for visits longer in duration than most office consultations, to allow time for discussion, patient input and education, and medication reconciliation. Despite many challenges, both awardees show promise and advance our understanding of the effectiveness of care coordination activities for people with I/DD. The relatively small numbers of beneficiaries enrolled (n=514 for DDHS and 347 for URI), and the three year time period for the HCIA-supported demonstrations, make it unlikely that positive impact would be seen on the CMMI core measures, or even on supplemental measures developed by the awardees. Policy makers should consider the likelihood that a long-term value proposition may be based on social responsibility and awareness, rather than return-on-investment.

Workforce Development

The impact of CHRPT innovations on workforce development is a major evaluation domain (see conceptual framework presented in Chapter 1). Across our rapid cycle quarterly reports to awardees and in our previous two annual reports to CMMI, we have documented how awardees have staffed and trained their staff to implement their models, the contextual factors that have motivated or constrained innovation, and the likely implications of these models for the development of the health care and home care (long-term services and support) workforce. In this section, we consider three key aspects of workforce with particular relevance for delivery system reform: workforce satisfaction; the training of personal care aides; and the use of lay health workers.

Workforce Satisfaction

In our First and Second Annual Reports to CMMI, we note the multiple challenges facing awardees as they seek to hire and keep qualified, experienced staff, given the relatively short timeframe (three years) of HCIA One funding and the shortages and frequent turnover in health care and home care labor markets. Many awardees note that their success is driven by the dedication and enthusiasm of their staff members, who are willing to work longer hours or expand their duties. For many transitional care and care coordination programs, the level of staff commitment to and availability for their clients is considerable. The sheer number of qualified staff is also critical for fully implementing and growing a program; a number of awardees observe that hiring and retaining project staff is the most important determinant of intervention success.

In NORC's Second Annual Report to CMMI (2016), we identify seven summary observations about staff retention and workforce satisfaction, based on analysis of qualitative and survey data, in the form of a set of lessons learned, as follows:

- Guard against burnout
- Plan for transitions at end of grants
- Establish a positive work environment
- Create support networks for staff
- Ensure access to other professional services and resources that clients need
- Allow for autonomy
- Emphasize the value of the work for beneficiaries as well as for staff

Many of these conclusions speak to the importance of managing stress in the workplace. The complexity and fast pace of innovation can, at times, be stressful, leading to high turnover; intrinsic motivation can be strongly influential in work performance.[341] NORC workforce trainee survey data for four of our awardees, together with qualitative data from interviews and site visits, enables us to assess workforce satisfaction, specifically considering how staff interaction with patients influences perceived workforce reward, across different levels of stress.[342] The four awardees are CCNC (pediatric specialty care co-management, staffed by nurses and lay health workers); PRHI (primary care resource centers established in community hospitals, staffed by nurse and pharmacist team); PPMC (transitional care and community-based care coordination under the aegis of a three-county Medicaid Coordinated Care Organization, staffed by a range of clinical and lay staff;, and Sutter Health (transitional care and care coordination for late-stage beneficiaries, staffed by nurse and social worker teams).

> "The difference you make in a person's care and overall outcomes is greatly rewarding. The sweat and frustration it takes to get there is very stressful."
> –Respondent, PRHI

Perceived workforce reward accompanies work-related stress: When asked to rank their HCIA-related work, the single largest group of respondents described their environment as one that offered both high reward and moderate stress (38 percent of PRHI respondents, 66 percent of CCNC respondents, 30 percent of Sutter Health respondents, and 32 percent of PPMC respondents); respondents for PRHI, PPMC, and Sutter Health were more likely than CCNC respondents, to rank their jobs as highly stressful as well as highly rewarding. In open-ended survey responses regarding stress and reward, respondents noted the positive impacts that they perceive their work having on patient health outcomes and on quality of life, and the relationships developed with patients where staff offer support, encouragement, or help coping with or navigating the health care system. Eighty-one percent of PRHI respondents (n=11), 75 percent of CCNC respondents (n=12), 62 percent of PPMC respondents (n=13), and 41 percent of Sutter Health respondents (n=29) described these measures of meaningful patient connection. When innovation staff have opportunities for meaningful relationships with patients and describe feeling empowered to make a

[341] Yoon Jik Cho and James L. Perry, "Intrinsic Motivation and Employee Attitudes. Role of Managerial Trustworthiness, Goal Directedness, and Extrinsic Reward Expectancy," Review of Public Personnel Administration 32 #4 (2012): 382-406.

[342] NORC designed a standardized, web-based survey for the four awardees, administered between May and June 2015 to a mix of clinical and lay staff (n=24 for PRHI, n=29 for CCNC, n=125 for Sutter Health, and n=38 for PPMC). Survey responses were tabulated to examine descriptive and analytic measures of association. Open-ended responses were categorized using a definition of meaningful patient connection, as defined above. See Appendix F for the full set of survey findings for each awardee.

difference in or contribute to a patient's quality of life, they also have higher levels of perceived reward, regardless of the level of workforce stress.

Summary. In dynamic and fast-paced intervention settings, intrinsic reward can be strengthened by enabling and training staff to establish meaningful connections with patients, empowering them to contribute to improving patient quality of life and health outcomes. While diverse in their goals, these four awardees are alike in treating medically complex beneficiaries in a time-limited context and a dynamic workplace environment. These common threads are correlated with higher levels of perceived workforce reward across stress levels.

Training of Personal Care Aides

The direct care workforce has an important place in health care delivery reform, offering critical home-based care to help keep people in their homes and avoid unnecessary hospitalizations or ED visits. For high-risk beneficiaries, delivering care that improves health and quality of care, while lowering unnecessary utilization and total cost of care, often means addressing the quality of long-term services and support and home care, as much as reform involves hospitals and providers. This requires home health and home care staff members who can function as part of the clinical team. They need to support the development and implementation of person-directed care plans, understand how to manage their clients' health conditions and know when a symptom requires a call to a doctor or 911, engage their clients in self-management of health conditions, and communicate effectively with clinical teams, whether accompanying a client to a medical appointment or calling a clinician to discuss a client's status. Three awardees have developed training programs that prepare the home care workforce and provide support for innovative approaches to health care delivery. These programs are specifically designed for personal care aides, and range from a four-month classroom-based training to lunchtime seminars to university-based home caregiver courses.

Beneficiaries—whether older adults, persons living with I/DD, or those with MCC, usually prefer home rather than institutional care. Especially for persons with mild cognitive impairment, the direct care worker provides a unique type of continuity of care, compared with the more intermittent patient contact experienced with other providers. To meet the home-based care needs of higher acuity beneficiaries, we need not only a sufficiently sized workforce, but also a home care workforce that has the knowledge, skills, confidence, and support to effectively care for clients at home and become part of the health care team.

The national shortage of personal care aides reflects many factors. The level of acuity among patients who are aging in place has steadily increased over time, and patients have multiple complex conditions that require skills to manage (and observational skills to detect changes that require attention). Consumers have increased expectations for high-quality home care and the ability of aides to address diversity (e.g., linguistic, cultural). At the same time, there is no consensus about the scope of skills, knowledge, and resources that caregivers need, the baseline of required competencies, or the number of training hours; each state sets its own licensing or certification requirements. Questions about the financing and delivery of training have policy implications for workforce development. In addition, employment as a personal care aide typically is not highly valued, despite the importance of this job to delivering high quality care.

Innovation must address how to elevate the status of this job so that more people choose direct care as a career path, rather than as a job of last resort.

Finally, the health and welfare of personal care aides is in itself an important policy issue. Caregiving is a physically and mentally demanding job. Higher acuity beneficiaries with multiple chronic conditions are likely to place new demands on caregivers. It is unclear whether an increased demand for advanced caregiver competencies will result in higher wages, commensurate with advanced training. Personal care aides are historically a low-wage workforce with no health insurance, sick leave, or other benefits.[343] In the case of one awardee (SCRF), aides were not paid for drive time to and from beneficiaries' homes and had to give up billable hours to participate in training, which was required. As the population ages, so, too, will the informal caregivers (family members) and paid caregivers who support them. It will be important to address the subsequent additional caregiver burden, and the physical, emotional, and financial stress that may be associated with the caregiving role.

Program Models and Practices. Three awardees have used their HCIA One funds to address workforce development specifically for personal care aides, with an eye toward testing models that could be replicated or scaled, as follows:

- *CLTCEC.* A four-month training program has been delivered in three California counties to MediCal In-Home Health Services (IHSS) clients and their caregiver providers. The program involves in-person, classroom-based didactic training, with pre- and post-testing to measure gains in skills, knowledge, and self-reported behavior change as a result of the training. Clients attend the first and final (17th) classroom session, together with their IHSS provider. A total of 6,602 IHSS provider trainees has been trained.
- *SCRF.* This program employs dedicated nurse care managers based at selected home care agencies in rural South Carolina, to develop client-directed care plans, supported by trained personal care aides. Training is unpaid and consists of a series of 12 monthly lunchtime seminars, hosted by agencies that employ the personal care aides. A total of 869 personal care aide trainees has been trained.
- *UAMS.* The Schmieding Center revised some of its existing home caregiver courses and prepared web versions of coursework, together with development of a new Family Caregiver Advocate (FCA) course. Courses have been offered in three states (California, Texas, Hawaii) in addition to Arkansas, and a microcredit financing option was available as part of the HCIA innovation. A total of 3,447 trainees has been trained.

Outcomes. Claims-based findings are limited, offering some evidence for the impact of training interventions on core CMMI performance metrics.[344] However, our evaluation has included robust qualitative and survey findings, enabling our assessment of how the models work and training program effectiveness, using the Kirkpatrick model.

[343] Caring for America's Aging Population: A Profile of the Direct-Care Workforce. 130 Monthly Lab. Rev. 20 (2007), at http://scholars.unh.edu/cgi/viewcontent.cgi?article=1013&context=soc_facpub; Occupational Employment and Wages, May 2015 – Bureau of Labor Statistics. 39-9021 Personal Care Aides. At http://www.bls.gov/oes/current/oes399021.htm .

[344] Please see the individual awardee chapters for more details about claims-based analyses.

Kirkpatrick Model to Assess Training Program Effectiveness:
Level 1: Reaction. How did participants react to the training program?
Level 2: Learning. To what extent did participants improve knowledge and skills as a result of the training?
Level 3: Behavior Change. To what extent did participants change their behavior on the job as a result of the training?
Level 4: Impact. What benefits result from the training?

- *Reaction.* Workforce respondents from all three awardees had very positive feedback on their training programs. Almost all CLTCEC IHSS providers (97 percent) were satisfied with the training overall and with various aspects of the training. Additionally, among those currently working as a caregiver, almost all UAMS trainees reported being very satisfied with their caregiver training (91 percent). Among the UAMS trainees, 99 percent reported that training materials were useful and 90 percent said that instructors often allowed adequate time for questions and discussions.[345]
- *Learning.* Trainees reported learning useful skills. Almost all CLTCEC respondents report an increase in knowledge about how to care for a person at home (96 percent); learning new skills (95 percent), in particular how to communicate with a consumer's care team (94 percent); and feeling better prepared to perform their job (99 percent). This sentiment was mirrored among SCRF respondents, with 96 percent reporting that training made them feel better prepared to be a personal care aide and more helpful to their clients. Among those currently working as caregivers, over 90 percent of UAMS trainees report having learned most skills listed in a survey item. UAMS trainees are more likely to report having learned stress reduction techniques, 94 percent of trainees versus 80 percent of comparators. However, unpaid and unemployed UAMS trainees are statistically less likely to report learning skills related to documentation monitoring changes in a client's health, feeling prepared to perform as a home caregiver, and talking with clients about home safety.
- *Behavior Change.* Trainings also led to behavior change among participants. Approximately 60 percent of CLTCEC respondents report increased communication with a consumer's healthcare team since the training. Some UAMS trainees took the FCA course that was developed with HCIA funds as an advanced-level offering. Those who completed the FCA course and were currently caregivers, (n=183) reported learning skills at or above the percentage of those who did not complete the FCA course (n=262). FCA completers were significantly more likely to report learning techniques for stress reduction and to have spoken with clients about home safety. For SCRF, 98 percent of respondents reported that the skills they learned help them to perform their duties with clients.
- *Impact:* Respondents reported a variety of benefits from their program trainings. Focus groups of CLTCEC IHSS trainees reflected increased knowledge and comfort as a care provider and a sense of empowerment as a professional from training, due to improved communication, self-care skills, and general relationship with their consumers. Similarly, over half of SCRF respondents (59 percent) reported that they liked their job more after starting their training. UAMS trainees discussed an enhanced relationship with their consumers and improved communication skills. However, UAMS trainees also experienced other benefits from training. When comparing UAMS trainees and comparators earnings, UAMS-trained caregivers earned $9.37 an hour, while caregivers from the comparison group earned $8.96 an hour, a statistically significant difference that remained after controlling for educational background, work type, and caregiver training (other than Schmieding Center training).

[345] See Appendix D, Exhibit "Training Structure, UAMS Trainees and Comparison Group" [Exhibit UAMS.4, Q7].

Summary. Three awardee training programs for personal care aides have graduated nearly 11,000 members of the home care workforce, better prepared to support innovative approaches to health care delivery. While all three awardees reported difficulty in recruiting prospective trainees, the training courses earned high marks from participants. Trainees report learning useful knowledge about chronic disease, new skills in communication with clients and providers, stress reduction and self-care, and delivering care at home; most express greater confidence in their own preparation and ability to perform their job. Trainees describe a range of benefits resulting from training, from greater satisfaction with work assignments to higher wages; UAMS-trained caregivers earned $9.37 an hour, while caregivers trained elsewhere earned $8.96 an hour, a statistically significant difference which remained after controlling for educational background, work type, and caregiver training. Organizations seeking to replicate or scale these training models should consider the scaling challenges faced by UAMS and CLTCEC, with each having to address the specific licensure or credentialing requirements for personal care aides in each jurisdiction (county or state) where training was offered.

Use of Lay Health Workers

Awardees with Models that Include Lay Health Workers

CCNC	UEMS
CKRI	U New Mexico
J-CHiP	URI
Lifelong	

For awardees targeting high-needs beneficiaries who are members of historically underserved or hard-to-reach groups (e.g., limited English proficiency, low-income household), the use of a CHW or other lay health staff (peer counselor or educator, life coach) can tap a powerful model with demonstrated evidence of effectiveness.[346] As we have noted in our Second Annual Report to CMMI (2016), the high acuity of beneficiaries targeted by many of our awardees, and the incentive to seek Medicare reimbursement, means that many of the models and practices being piloted or scaled employ licensed clinicians, typically nurses, and less often, social workers or behavioral health specialists with at least a bachelor's degree, to perform care coordination, patient navigation, and referrals to community benefits and supports (e.g., food, transportation, housing). Yet, seven awardees have employed lay health workers, either CHWs or peer educators, to engage beneficiaries who are members of historically underserved groups or are otherwise considered hard to reach.

346 USDHHS, HRSA, Bureau of Health Professions. Community Health Workers National Study. March 2007.

Populations. These awardees serve Medicaid (CCNC, UEMS, U New Mexico) and dually eligible beneficiaries (CKRI, LifeLong, J-CHiP, URI). One enrolls very high-risk children across the state of North Carolina (CCNC); three target young adults and adults living with a disability or I/DD and emphasize independent living skills for their enrollees (CKRI, LifeLong, URI); and four target adults with multiple chronic conditions, likely to have a behavioral health or substance abuse diagnosis and to live in a low-income household (LifeLong, J-CHiP, UEMS, U New Mexico). Priority populations are disproportionately represented among those served by these awardees, including racial and ethnic minority groups (e.g., African Americans make up about one-quarter to three-quarters of enrolled beneficiaries, depending on the awardee) and those with limited English proficiency (e.g., Spanish speakers, for CCNC, LifeLong, and U New Mexico).

> "*A community health worker is a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served. This trusting relationship enables the worker to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery.*
> *A community health worker also builds individual and community capacity by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, social support, and advocacy."*
>
> Source: American Public Health Association (http://www.apha.org/apha-communities/member-sections/community-health-workers, accessed 8.2.16)

Program Models and Practices. Among the seven awardees, there are diverse roles and duties for lay health workers. They conduct outreach to prospective enrollees and their caregivers, serve as patient navigators, and act as peer coaches and teachers. Some are integrated into health care teams (CCNC, J-CHiP community arm, LifeLong, U New Mexico), while other models embed or co-locate a lay health worker at a clinic but do not consider the lay health worker to be part of the clinical team (CKRI, UEMS, URI). The J-CHiP community arm uses lay health workers in multiple ways, with CHWs embedded in eight primary care clinics as part of behavioral health teams and with community outreach in East Baltimore neighborhoods conducted by two community-based organizations that are implementation partners, Sisters Together and Reaching (CHWs) and Men and Families Center (lay Neighborhood Navigators). Peer coaches co-teach the Stanford Chronic Disease Self-Management Program (CKRI) or Living Well with Disability (Lifelong), counsel enrolled beneficiaries individually as well as lead life skills classes (URI), and, in the case of URI, provide life coaching and assistance with employment. Across the complex/high-risk portfolio, lay health workers fulfill three of the four key tasks that characterize the CHW model, as care team members, patient navigators, and providers of screening and health education; none of the awardee models includes the use of lay health workers in a community organizing role (promoting "community action and builds community support for new activities").[347]

Outcomes. While we identify statistically significant cost savings and reductions in utilization for many of these awardees, relative to a matched comparison group, our analysis does not allow us to identify the specific impact of lay health workers. Four of the five awardees for whom claims data on cost are available (CKRI, J-CHiP community arm, UEMS, U New Mexico) show Medicaid cost savings of between $717 and $2,044 per beneficiary per quarter, with one awardee (URI) estimated to incur

347 USDHHS, HRSA, Bureau of Health Professions. Community Health Workers National Study. March 2007.

Medicare costs of $2,360 per beneficiary per quarter. Three awardees have decreases in hospitalizations of between 15 and 148 per 1,000 beneficiaries per quarter (J-CHiP community arm, LifeLong, and UEMS), three have decreases in ED visits (J-CHiP community arm, LifeLong, and UEMS), and J-CHiP's community arm is also associated with a decrease in 30-day hospital readmissions (36 fewer per 1,000 beneficiaries per quarter). Findings that quality of care declined for UEMS, as measured by significantly fewer practitioner visits following discharge from the ED (at 90 days post-discharge), are likely to reflect the ongoing difficulties that innovation staff described in obtaining timely primary and specialty care outpatient appointments for enrolled beneficiaries.

Site visit and survey data, capturing both consumer/caregiver and workforce trainee perspectives, speaks to the value of lay health worker involvement in implementation. An independent evaluation by the University of Colorado of the UEMS innovation finds that enrolled beneficiaries credited their CHWs with enabling more timely access to follow-up provider appointments (an observation not supported by NORC's claims-based findings as summarized above). While most respondents said that participation has not changed their relationship with the health care system, there is a statistically significant increase in the percentage of survey respondents who identify themselves as having a primary care provider.[348] LifeLong's project leadership sees the role of peer educators as central to their innovation's success and the marketing of peer-led independent living skills workshops (with outside certification of peers as facilitators) to safety net providers with capitated funding as an important sustainability strategy.

> "As a peer, it's impressive. Sometimes you hear the same problem that you have. And it's like, how I can solve that? I grew up as a person through my work. If I can tell them their options, I have to see my options too. They are the ones who are bringing me back…. When they start seeing you as a peer, as a person, then you are seen as more than a service. That's when I feel that it is working."
> --LifeLong Focus Group with Peer Coaches

Awardees have struggled to integrate lay health workers into clinical workflow, often in places where providers have not worked before with non-licensed staff as equal partners in care delivery. Both LifeLong and U New Mexico staff described this challenge in terms of culture change and emphasized the importance of ongoing training across professional lines, to engage clinicians around the value of innovation that includes lay health workers and a social rather than medical orientation, and to communicate clearly about the respective duties of clinical and non-clinical staff in implementation; for example, two CHWs are part of each Outpatient Intensivist Team in the U New Mexico innovation and have participated in the weekly Complex Care Clinic (video-enabled grand rounds for specialty consultations) that is central to the project. In the case of UEMS, CHWs described the psychological stress and cognitive dissonance of trying to recruit non-urgent, frequent ED utilizers for the HCIA-supported innovation in a hospital ED, where patients might be actively dying or in otherwise traumatic circumstances, and clinicians are focused on short-term triage and management. For URI, both Living RIte sites reported difficulties in communication and teamwork between the innovation's peer life

> "It's new to RI, the CHW piece of things. As an industry, CHW's need to come together for a standard of care to be billable. They need a minimum education level, a philosophy…It needs to be professionalized. As much as you want to think of it as a peer kind of thing, there should be a professional standard. If there is one for your mail carrier and milkman, there needs to be an agreed upon professional standard."
> —Living RIte Center Director

[348] University of Colorado, unpublished evaluation findings shared with NORC.

coaches and other project staff; one site director notes that certification in life coaching, as well as comparable life experience to enrolled beneficiaries, would have improved the effectiveness of lay health workers.

Factors Related to Innovation. State Medicaid reimbursement policies appear to have a key influence on the decision to use lay health workers. At Lifelong, reimbursement is available for peer educators to engage in one-on-one coaching or to teach Living Well Workshops; care coordination by CHWs is reimbursed in New Mexico; and UEMS's sustainability plan has included use of CHWs as patient navigators, with reimbursement under a New York State DSRIP demonstration. A related issue for LifeLong, also reflecting the challenge of integrating lay health workers into clinical teams, is accumulating adequate billable hours (one-on-one counseling, facilitating workshops) for peer coaches. Leadership notes, "[T]o make this work, we would have to charge a lot more money than we expected for billable hours to offset cost of unbillable work. This is a huge problem for us. The sustainability of this kind of work after the HCIA funding runs out is a puzzle we haven't solved yet…It takes some time for the health center staff to learn what peer coaching is and to make referrals. It's tough to get a point to when a peer coach is sustainable through billable services. It is replicable, but it takes time."

Summary. The experience of seven complex/high-risk awardees attests to the value of lay health workers in models that serve medically complex beneficiaries. Organizations that would incorporate a CHW or peer coach into clinical workflow should consider conducting feasibility assessments of the available workforce, ensuring oversight by clinical staff; securing acceptance of lay worker involvement by physicians, nurses, and other clinicians; clarifying roles and expectations across teams; seeking mentorship from similar organizations with successful programs; and partnering with State Medicaid plans from the beginning of the innovation program effort.

Sustaining and Scaling Innovation in the Context of Delivery System Reform

In addition to populations and workforce, the issue of sustaining and scaling innovation is a central concern for our evaluation of the complex/high-risk patient targeting portfolio. What factors enable and constrain innovation for medically-complex beneficiaries that can be sustained, replicated, or scaled? Which specific conditions allow awardees to move beyond developing value propositions--and moving to accelerate impacts?

Awardees in the complex/high-risk patient targeting portfolio have tested various models to advance the goals of HCIA's Round One grant program and ensure the longevity of these programs beyond their respective funding periods. During the course of this project, various awardees have developed innovations that are/can be replicated or scaled. While not all awardees' innovations will do so, the experiences of these awardees nevertheless provide important lessons about the internal and external conditions required to replicate or scale these or similar programs.

In this section, we summarize key themes related to these awardees' activities related to sustaining, replicating and/or scaling their innovations—all within the broader context of delivery system reform.

Summarizing Awardees' Experiences

Awardees With a No-Cost Extension (6 to 12 months)

CLTCEC	PCCSB
CKRI	PRHI
DDHS	St. Francis
J-CHiP	UEMS
JHU SON	UAMS
LifeLong	U New Mexico
Northland	UT Houston

This is our third and final summative assessment of the 23 awardees in this portfolio. For this third and final Annual Report, we consider the experience of the no-cost extension (NCE) awardees over the past year, as well as the reflections of awardees in their final reports. Since our Second Annual Report to CMMI (2016), which was based on data through spring 2015, we have reviewed final self-reported data for the 11 awardees that did not receive a NCE or that received a 90-day NCE for the purpose of an orderly closeout to their HCIA funding, as well as a more extensive set of primary data for the 12 awardees with NCEs ranging between six and 12 months, through June 30, 2016. (These data include awardee quarterly reports to CMMI and one telephone interview with each awardee, conducted in spring 2016). Our evaluation design does not permit us to follow the experience of awardees after the closeout of HCIA funding, so our assessment of sustainability, replicability, and scaling is based on reviewing awardee plans and their implementation experiences.

In NORC's First Annual Report to CMMI (2014), we noted that most awardees faced significant challenges to replicating or scaling their respective interventions. The experiences of awardees who used HCIA One funds to replicate an evidence-based model (JHU SON, Sutter Health, U North Texas) or a modified version of a previously tested model (DDHS, U New Mexico) provided evidence of these challenges. The size and scope of an intervention were identified as affecting the capacity to sustain or replicate an awardee's program, e.g., whether the HCIA grant supported scaling of an earlier pilot and leveraged trained, experienced staff already onboard with the awardee, or whether an awardee used HCIA funds to accelerate the spread of practices already adopted by a health care system or providers (J-CHiP, PPMC). Factors identified as key shared concerns for sustainability are summarized as follows:

- **Financing.** Use of HCIA One funds to demonstrate a business case for innovation is predicated on being able to secure additional revenue to maintain or expand the scope of innovation. Value-based and capitated payment approaches (e.g., accountable care organizations, global budgeting) can leverage the HCIA investment. Awardees endeavored to improve the likelihood of a positive return on investment by refining the targeting of prospective enrollees to those most likely to benefit and using staffing models and delivering services that can be reimbursed under existing Medicare or Medicaid rules.
- **Staffing.** The hallmark of successful innovation in the complex/high-risk portfolio is hiring the right person for the job, typically a clinician (less often, a lay health worker) with many years of experience working with the target population and setting(s) in which services are delivered. Multiple awardees cited difficulty hiring and retaining staff as a roadblock to full or sustained implementation, in the face of local or regional labor market shortages for clinicians or high turnover for personal care aides.
- **Partner and Stakeholder Engagement.** Positive relationships with implementation partners and stakeholders at the local, regional, and national level are cited as important foundations for successful innovation. Partner buy-in is especially important for innovations that link home and community settings to provider offices or hospitals, or that work with unaffiliated health systems. Innovations were more likely to be sustained when they were integrated into an organization that offers long-term stability. Some awardees tapped partners or stakeholders with whom they had worked previously,

leveraging the trust and familiarity of existing relationships and benefitting from in-kind support as well as administrative and local political support for the HCIA-funded innovation.

In NORC's Second Annual Report to CMMI (2016), we further identify exogenous (external) and endogenous (internal) contextual factors related to sustaining, replicating, and scaling innovation:

Exogenous Factors

- **Regulatory and Policy Environment.** Several programs in states with expanded Medicaid programs under the ACA experienced more rapid growth in their enrolled populations than had been anticipated. In addition, the restructuring of state Medicaid programs that resulted from new financing and program design options under the ACA (and also stemmed from new state policy directives), launched concurrently with HCIA awardee programs, presented unexpected challenges, as well as pathways for growth. Also, HCIA awardees operating in more than one state had to contend with local and divergent policy and market environments in such areas as training and licensure. Federal and state regulations inspired innovation; however, if not enforced or given priority, these regulations could have less impact.
- **Marketplace Dynamics (Health Care Services and Labor Markets).** The single most important factor related to sustainability was payer arrangements. In addition to the presence or absence of reimbursement for an innovation's services, the widespread and ongoing reform of state Medicaid programs created short term uncertainties and delays in awardee plans to sustain or scale their innovations. In addition, corporate mergers among awardee host organizations and among market counterparts also challenged implementation and sustainability. Also, awardees in rural areas in particular cited difficulties in recruiting qualified staff for their innovations.
- **Stakeholders and Partnerships.** The scale and scope of innovations, and that of an awardee's host organization, had implications for the centrality of partnerships with outside organizations. Alignment of goals, staffing, and delivery model between the innovation and that of stakeholders or partners were key to launching and sustaining an innovation. Professional and clinical organization partners were also critical supports for quality improvement initiatives. The time required to cultivate support and partnerships was substantial, especially when innovation involved broadening the scope of services delivered or target groups served.
- **Community Resources.** For awardees serving economically disadvantaged or socially isolated populations and beneficiaries with psychiatric or substance use disorders or functional disabilities, the availability of food and prepared meals, transportation, affordable housing, and other supports were key to successfully addressing needs.

Endogenous Factors

- **Organizational Capacity.** The capacity of an awardee or its host organization to internalize savings or leverage an innovation's new approaches to staffing or service delivery conferred an advantage in sustainability. Those with extensive internal management and capital resources to operate complex interventions in changing, uncertain, or provisional financing environments, had a clear advantage in sustaining or scaling their HCIA innovations. Programs with multiple sites, where oversight is delegated to local managers or partners, were more likely to see these sites take ownership of the innovation and be committed to sustainability.

- **Leadership.** While leadership qualities varied among awardee project teams, reflecting the diversity of the complex/high-risk portfolio, success across the portfolio required innovation leaders with a vision for how to accomplish and sustain change that was shared by the awardee's host organization. Many innovation leaders were recognized as authorities in their fields and considered trustworthy by colleagues, stakeholders, and potential partners, reflecting many years of collaboration. Especially in the dynamic environments in which innovations have been launched, leaders needed to maintain a clear vision of their goals.
- **Organizational Culture and Inter-Professional Teamwork.** Promoting teamwork often involved changing traditional roles and clinical workflow. Clarity about the roles played by different team members and a shared understanding of how they related to the innovation's goals were found to be important. An organizational culture that fostered critical self-awareness among staff with respect to performance and that welcomed contributions to improving performance by staff at every level helped providers achieve and sustain reforms in clinical practice and service delivery.

In this final, Third Annual Report, we add some final cross-cutting observations on the 23 awardees, which build on the policy-relevant themes from our First and Second Annual Reports:

Major Impact of State Delivery System Reform. We have found that delivery system reform (text boxes, below), especially at the state level, is a fulcrum for program sustainability; it is crucial in shaping the fate of innovations across the portfolio. HCIA awardees must navigate concurrent financing and delivery system reform. Medicaid eligibility expansions under the ACA have increased the reach of innovations (J-CHiP in Maryland, U New Mexico, PPMC in Oregon). These expansions have placed administrative burdens on state Medicaid agencies and health plans that can impede efforts to fully implement innovation (CLTCEC), while at the same time offering some awardees the opportunity to internalize offsetting costs and savings in redesigned service delivery (PPMC). A state Medicaid program's shift from fee-for-service to managed care contracting and value-based purchasing may not be aligned with an awardee's efforts at innovation (CCNC, URI).In the case of Medicare, new or nascent Accountable Care Organizations may not be ready to sustain capitated funding post-HCIA (Northland, PCCSB).

Delivery System Reform: Examples for Medicare

Dually eligible beneficiaries:

- Financial Alignment Initiatives
- Initiative to Reduce Avoidable Hospitalizations Among Nursing Home Residents
- State Demonstrations for Duals

Value-based purchasing:

- Accountable Care Organizations (Pioneer, Shared Savings)
- Bundled Payments for Care Improvement
- Maryland All-Payer Model
- Primary Care Transformation
- State Innovation Model (SIM)

National Association of Medicaid Directors & Bailit Health, *The Role of State Medicaid Programs in Improving the Value of the Health Care System* (2016)

Delivery System Reform: Examples for Medicaid and Children's Insurance Program

Payment models:

- Per patient per month, e.g., Patient-Centered Medical Home
- Episode-based payment with shared risk across providers
- Population-based payment, e.g., Accountable Care Organizations (ACOs)
- Multi-payer alignment, e.g., Delivery System Reform Incentive Payment (DSRIP)

Waivers [1115, 1915(c)]:

- Home- and community- based services
- Long-term services and supports

Expansion populations under Affordable Care Act

Kaiser Family Foundation & American Institutes for Research, *Payment and Delivery System Reform in Medicare* (2016).

Awardees have attempted to sustain and scale their innovations by aligning with delivery system reforms, using a number of strategies:

- Changing staffing models: whether CHWs were reimbursed for Medicaid preventive services (UEMS) and for one awardee, a shift from RN to MD home visits to enable Medicare billing (PCCSB)
- Using new Medicare billing codes (advance care planning, chronic care management) and reforms (e.g., bundled payments) (Sutter Health)
- Collaborating with Medicaid managed care health plans to incorporate partial to full coverage of HCIA-supported services (LifeLong, U New Mexico, UT Houston); obtaining certification as Medicaid provider (Northland); or seeking approval for some or all of an HCIA model to become a covered service under a Medicaid home and community-based care waiver (JHU SON, SCRF).
- Conducting outreach to prospective partner hospitals, SNFs, and health care systems that are motivated in part by potential Medicare penalties on hospital readmissions (U North Texas, VUMC)

Different Pathways to Scale Innovation Impacts. As the prior section attests, awardees have developed a variety of strategies to scale impacts related to their innovations. Scaling impacts may involve replicating or expanding existing programs—even on a national scale—but numerous alternatives that may be effective. Some of these strategies are designed to replicate or expand the innovations, as designed; some aim to replicate specific aspects or components of an innovation; and others aim to scale concepts or ideas that other organizations can implement in the future.

- Several awardees have successfully expanded (or report planning to expand) their programs by adding sites in their respective geographic areas and/or in other parts of the country (BIDMC, U North Texas, J-CHiP).

- Other awardees have decided not to expand their entire programs, but they plan to continue components of (or scaled-down versions of) their original intervention (CLTCEC, Sutter Health, UEMS, U Iowa, VUMC). One awardee has elected not to continue its program but is transferring its innovation training modules to another institution in its home state, which plans to carry forward the training activity (SCRF).

Awardees' Strategies to Scale Innovation Impacts
- Replicate program within home institution, system, or externally
- Expand components of the innovation or a scaled-down innovation
- Hand-off/transfer components of an innovation to another institution
- Scale ideas/disseminate lessons widely

- Awardees are sharing lessons learned about their innovations with other organizations through various channels, e.g., peer-reviewed health journal articles, documentaries focusing on program effectiveness, presenting findings in meetings with stakeholders (e.g., UT Houston). In other words, this dissemination can be viewed as scaling ideas and concepts related to the innovation.

Some awardees have not attained replication or scale; in fact, they are still focused on finding ways to *sustain* their existing programs. They are pursuing funding from government and non-government sources—through federal, state, and local funds; private foundations; partner organizations; and internal funding from their home institutions. One awardee (JHUSON) even received a foundation grant to work with a business development consultant to develop a long-term financial sustainability plan for its innovation. As noted earlier, funding is a major concern/barrier for awardees in terms of sustainability; many of the awardees, as of this third Annual Report, are pursuing multiple avenues for financial support for their programs.

Summary. Overall, based on the three years of our evaluation, we conclude that favorable payer arrangements, alignment of innovation with partners and stakeholders, robust organizational resources, and community resources (to address social determinants of health) are important for sustaining, replicating, and scaling innovation for this HCIA One portfolio. We also find many diverse ways of scaling innovation impacts, not only through direct expansion of existing innovations, but also in carrying forward discrete components of the innovations, as well as in advocating for models of care for these high-risk, complex populations that other organizations can adopt and scale in the future.

Conclusions

Our evaluation is organized around case studies of the 23 awardees in the complex/high-risk patient targeting portfolio. Yet, there are policy-relevant lessons to be drawn from the collective experiences of these awardees as they seek to improve the experience of beneficiaries and, frequently, their caregivers, with the health care system and long-term care services and supports, while improving the efficiency and effectiveness of services delivery and preparing the health care and home care workforces for the challenges of an aging, medically complex population

Populations. Twelve awardees serve Medicaid and dually eligible populations, with many achieving cost savings, mixed findings for utilization and quality of care, and an attenuation of cost savings for dually eligible beneficiaries, compared with beneficiaries enrolled only in Medicaid (J-CHiP). Referrals to community benefits and supports that address the social determinants of health are essential to successful innovations, and other effective components include home visits and the co-location of referral staff with

clinicians. For beneficiaries living with late-stage illness, five awardees show cost savings, with a mixed set of utilization outcomes. Hiring staff with previous experience in hospice care (where RNs are involved in ACP conversations) and training intervention staff in communication techniques and end-of-life planning, are critical to the success of advance care planning, as is consideration of state regulations around care planning, access to hospice or palliative care services for Medicaid beneficiaries, and the role of family and participant beliefs about the end of life. Five awardees focus on individuals with behavioral health and/or substance abuse diagnoses, a population that is often marginalized, difficult to reach, and facing substantial unmet social service needs. Models feature integrated delivery of primary and mental health care and care coordination, the use of lay health workers and a focus on staff training in motivational interviewing and for two awardees, trauma-informed care approach. Awardees have demonstrated success in achieving cost savings, with mixed utilization findings. Finally, two awardees target services for beneficiaries living with intellectual and/or developmental disability, demonstrating the value of care coordination for this population and the importance of capitated funding to enable providers to meet the needs for discussion, patient engagement, and medication reconciliation during office visits. Both awardee models show promise, despite many challenges. The relatively small numbers of beneficiaries enrolled, and the three year time period for the HCIA-supported demonstrations, make it unlikely that positive impact would be seen.

Workforce Development. For most awardees, staff commitment and availability is considerable. The sheer number of staff is also critical for fully implementing and growing a program; hiring and retention can be the most important determinant of success. Findings from NORC workforce trainee surveys of four awardees indicate in stressful and fast-paced intervention settings, intrinsic reward can be strengthened by enabling and training staff to establish meaningful connections with patients, empowering them to contribute to improving patient quality of life and health outcomes. Diverse in their goals, these four awardees are alike in treating medically complex beneficiaries in a time-limited context and a dynamic workplace environment. The training of personal care aides is central to innovation for three awardees, who have prepared nearly 11,000 members of the home care workforce to more effectively support innovative approaches to health care delivery. While claims-based findings are limited, and all three awardees reported difficulty in recruiting prospective trainees, the training courses earned high marks from participants for gaining new knowledge, skills, and greater confidence in their own preparation and ability to perform their job. For one awardee (UAMS), graduates earn higher wages than do caregivers trained elsewhere, a statistically significant difference which remained after controlling for educational background, work type, and caregiver training. Finally, while the medical complexity of beneficiaries, and the incentive of Medicare reimbursement, means that most models being piloted or scaled employ licensed clinician or social workers for care coordination, patient navigation, and referrals to community benefits and supports, seven awardees employ lay health workers, either community health workers or peer educators, to engage beneficiaries who are members of historically underserved groups or are otherwise considered hard to reach.

Sustainability and Spread of Innovation. Favorable payer arrangements, alignment of innovation with partners and stakeholders, robust organizational resources, and community resources (to address social determinants of health) are important for sustaining, replicating, and scaling innovation for this HCIA One portfolio. In addition, we find myriad ways of scaling innovation impacts, including direct expansion of existing innovations, but also in carrying forward discrete components of the innovations and in advocating for models of care for these high-risk, complex populations that other organizations can adopt and scale in the future.

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	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 residence
APN	advanced 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 Services Virtual Research Data Center
COPD	chronic obstructive pulmonary disease
DID	difference-in-differences method
DME	durable medical equipment
DUA	data use agreement
E&M	evaluation and management
ED	(hospital) emergency department
EDB	eligibility data base
EHR	electronic health record
EOL	end of life
ESRD	end-stage renal disease
FQHC	federally qualified health center
GEE	generalized estimating equation
GLM	generalized linear model
HH	home health
HCC	hierarchical condition categories
HTN	Hypertension
IADL	Instrumental Activities of Daily Living
ICU	hospital intensive care unit
IDD	intellectual and/ developmental disability
IL	independent living residence
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
MCO	managed care organization
Medicaid FFS	Medicaid Fee-For-Service

Acronym	Description
Medicaid MC	Medicaid Managed Care
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
PAC	post-acute care
PACE	Program of All-Inclusive Care for the Elderly
PC, PCP	primary care, primary care provider
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
SNF	skilled nursing facility

Appendix C: Methods, Claims-based Analyses

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 cost, utilization, and quality of care. Most quantitative analyses focus on the four CMMI core measures: all-cause hospitalizations, emergency department (ED) visits, hospital readmissions, and total cost of care, as appropriate.[349] 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 of quality of care 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 our general analytic approach.

Analytic Approach

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

- Post-acute care (hospital) 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 (community) 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.

[349] The four core measures identified by CMMI are intended to provide a consistent set of measures for comparison across evaluation of all 107 first round HCIA awardees.

Exhibit C.1: Intervention Settings by Awardee

Hospital	Community		Hospital & Community
▪ 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 Evaluation Design

	Post-Acute Care (Hospital)	Ambulatory Care (Community)
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	Difference in differences	Difference in differences; Time Series
Unit of Analysis	Beneficiary-episode	Beneficiary
Comparison Group	Provider level. Beneficiary-episodes from similar, non-participating facilities or peer providers. Propensity score standard mortality ratio (SMR) or relative weighting.	Geographic area (comparable counties). Beneficiaries receiving usual source of care, identified from claims. Propensity score matching.

Post-Acute Care (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.

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 90-day total cost of care, 30-day hospital readmission rate, 90-day hospital readmission

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

Ambulatory Care (Community) Interventions. Participants in community interventions are not enrolled based on an acute event (hospitalization) but typically are patients presenting to the awardee program site during the intervention period, meeting the awardee's specified eligibility criteria. 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, we have claims data to create comparison group for almost all ambulatory care awardee interventions.

Our analysis for community 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 total cost of care in the quarter, all-cause hospitalizations per quarter, emergency department visits, and 30-day hospital readmissions per quarter, . For certain awardees we include either ambulatory care-sensitive (ACS) hospitalizations or potentially avoidable hospitalizations as a supplemental measure of quality of care.

Analytic Design

Our design 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 have presented a brief status update on prospects for completing our evaluation. In our third annual report to CMMI, we offer a summary for awardees where claims data are not available.
- **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 presents a summary of NORC's selected measures and models for our claims-based analyses.

Exhibit C.3: Types of Analyses for Claims-Based Measures in NORC Third Annual Report

Awardee	Claims Data	Difference in Differences (DID) Models		Notes
		Core Measures	Supplemental Measures	
BIDMC	Medicare	■	7-day and 30-day practitioner follow-up visits post-discharge	
CLTCEC	Medicare	■	ACS hospitalizations	Focus on ED visits and hospitalizations. Information on Medicaid usability also provided.
CCNC	Claims not available	N/A		
CKRI	Medicaid & Medicare	■		
DDHS	Medicare & Medicaid	■	ACS hospitalizations	
J-CHiP	Medicare & Medicaid	■	■ 7-day and 30-day practitioner follow-up visits post-discharge ■ ACS hospitalizations ■ Potentially avoidable hospitalizations	Hospital Arm: Subgroup analysis for discharges to partner SNFs Community Arm: Subgroup analysis by type of program and dose. Hospital and Community Arms (Medicaid): Subgroup analysis for dually eligible beneficiaries
JHU SON	Medicare & Medicaid	■	ACS hospitalizations	
LifeLong	MediCal health plan	■		Focus on ED visits and hospitalizations; claims data on cost not available
Northland	Medicare	■	ACS hospitalizations	
PCCSB	Medicare	■	ACS hospitalizations	
PRHI	Medicare	■	7-day and 30-day practitioner follow-up visits post-discharge	Subgroup analyses for beneficiaries with AMI, CHF, COPD diagnoses
PPMC	Medicaid	■		
SCRF	Medicare	■	ACS hospitalizations	
St Francis	Medicare	■	■ 7-day and 30-day practitioner follow-up visits post-discharge ■ ACS hospitalizations	
Sutter Health	Medicare	■	ACS hospitalizations	Primary analysis looks at end of life experience; subgroup analysis looks at all beneficiaries
UEMS	Medicaid	■	■ 7-day, 30-day, and 90-day practitioner follow-up visits post-ED discharge ■ potentially avoidable hospitalizations	
UAMS	No claims available	N/A		
U Iowa	Medicare	■	7-day and 30-day practitioner follow-up visits post-discharge	
U New Mexico	Medicaid	■	potentially avoidable hospitalizations	
U North Texas	Medicare	■	■ 30-day total cost of care ■ ACS hospitalizations	Subgroup analyses for SNF and AL/MC settings and for End-of-Life (AL)
URI	Medicare	■	ACS hospitalizations	
UT Houston	Medicaid	■		Comparing two phases of enrollment (pre- and post-September 2013 randomizing of participants), sensitivity analysis for Phase 2
VUMC	Medicare	■	■ 30-day practitioner follow-up visits post-discharge ■ ACS hospitalizations	Subgroup analyses for geriatric syndromes and for End-of-Life

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.

- For six awardees, timely Medicaid claims data are not available (CCNC, DDHS New Jersey enrollees, PCCSB, SCRF, St. Francis, Sutter Health).
- Six awardees are providing us with Medicaid data from their plan partners (CLTCEC, LifeLong, and PPMC) or Medicaid data that they have from the state (CKRI, U New Mexico, UT Houston).
- For two awardees, we have Medicaid Management Information System (MMIS) data from Maryland (J-CHiP, JHU SON).

For seven of the remaining eight awardees, we use Alpha Medicaid Analytic eXtract (Alpha-MAX). Current Alpha-MAX data through 2013 is available for only one of these awardees (UEMS). We are closely monitoring the timing and availability of Alpha-MAX for seven other awardees. For the eighth of these awardees (CCNC), Alpha-MAX is only available for 2012 in North Carolina, and there have been delays with Alpha-MAX production for that state, due to a change in MMIS vendor. While the awardee has shared their own claims-based analysis, our inability to access claims limits our ability to evaluate CCNC.

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, Health Net, IHEP, Molina, Care 1st, LA Care)	Received files from all health plans
CCNC	NC	100%	Alpha-MAX (2012)	Timely Data Unavailable
CKRI	MN	100%	MN Department of Human Services	Data received from MN Department of Human Services, 12/23/15.
DDHS	NJ	96%	Alpha-MAX (2011)	Timely Data Unavailable
	NY		Alpha-MAX (2011 – 2013)	DID analysis of NY Medicaid population
J-CHiP	MD	36%	MD State MMIS	Hilltop provided data in November 2015
JHU SON	MD	100%	MD State MMIS	Hilltop provided data in November 2015
LifeLong	CA	100%	Plan partner (Alameda Alliance)	Received updated sample files from Alameda on 3/18/16
Northland	ND	26%	Alpha-MAX (2011)	Timely Data Unavailable
PCCSB	CA	22%	Alpha-MAX (2011)	Timely Data Unavailable
PPMC	OR	95%	Alpha-MAX (2011-2013)	Switched to Alpha-MAX for AR3 since Medicaid data from Awardee (HealthShare) was not usable for comparison group.
St Francis	HI	24%	Alpha-MAX (2011)	Timely Data Unavailable
SCRF	SC	82%	Alpha-MAX (2011 – 2012)	Timely Data Unavailable
Sutter Health	CA	14%	Alpha-MAX (2011)	Timely Data Unavailable
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%	New Mexico MMIS data from Awardee	U New Mexico contractor, NYU, supplied analytic data set in December 2015
URI	RI	100%	RI MMIS Data with JEN Associates	Since no clear trends detected for Medicaid data, focus has shifted to DID for Medicare claims.
UT Houston	TX	88%	Texas MMIS Data from Awardee	Obtained Texas MMIS data for treatment and original control group from awardee

In the subsequent sections, we summarize for both the hospital and community 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, specification of analytic models to assess program impacts, and presentation of both summative and aggregate impacts.

Post-Acute Care (Hospital) 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 include Medicare discharges occurring on or before Sep 30, 2015, with a 90 day episode period through December 31, 2015. Claims through Mar 31, 2016 are used for an additional 90 days claims run off period. The last quarter included in our analysis is Quarter 3 of 2015 (through Sep 30, 2015).

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. For awardees with Medicaid populations we used a similar approach with Medicaid 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;
- reason for Medicare and/or Medicaid eligibility, e.g. denoting the whether the beneficiary was eligible for Medicare due to age, disability, or end-stage renal disease (ESRD);
- risk score such as hierarchical condition categories (HCC) and associated indicator flags, using all diagnoses 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 all seven PAC awardees. 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 treatment and comparison groups on potential confounding factors.[350]

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.[351] This is a 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 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

[350] We use propensity score weighting for hospital awardees, since we use a serial cross-sectional design in which beneficiary-episodes are compared between the pre- and post-intervention periods.

[351] 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; 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; Welch, H. Gilbert, et al. "Geographic variation in diagnosis frequency and risk of death among Medicare beneficiaries." JAMA 305 #11(2011): 1113-1118.

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 Oct 2015.

Exhibit C.5: Sampling Frame for Comparison Groups, Hospital Evaluation Design Awardees

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
J-CHiP	Beneficiary-episodes from three comparison hospitals	The University of Maryland Medical Center, St. Agnes Hospital and Franklin Square Hospital[352]
PRHI	Beneficiary-episodes for AMI, COPD, or CHF from ten comparison hospitals	Jameson Memorial Hospital, Meadville Medical Center, Monongalia (Mon) General Hospital (WV), 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.
St. Francis	Beneficiary-episodes associated with AMI, CHF, Pneumonia, COPD or ESRD from two comparison hospitals in Hawaii	Kona Community Hospital and Kaiser Foundation Hospital[353]
U Iowa	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
U North Texas (SNF)	Beneficiary-episodes from 25 hospitals, discharged to 55 comparison SNFs with characteristics similar to those of Brookdale Senior Living's SNFs	All beneficiary-episodes discharged to non-BSLTOC SNFs from hospitals that discharge a large volume of patients to BSLTOC SNFs (at least 50).
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 standardized mortality ratio (SMR) or relative weighting to estimate ATT since these methods maximize the study's power to detect differences by retaining all

[352] 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 both case mix and patient demographics.

[353] Kona Community Hospital is similar to Hilo Medical Center, and Kaiser Foundation Hospital is similar to Queen's Medical center West, in both case mix and patient demographics.

awardee beneficiary-episodes in our analysis. [354] Beneficiary-episodes at the awardee site in the pre- and post-intervention period may be systematically different, requiring our PS model to account for four distinct groups: pre-HCIA treatment group, post-HCIA treatment group, pre-HCIA comparison group, and post-HCIA comparison Group. 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 risk 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 10 percent (±0.1), we deem the two groups to be meaningfully different. On the other hand, if the standardized difference is less than ten percent, 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 SMR weighting, awardee episodes are given a weight of one while weights for comparison episodes are defined as the ratio of the estimated PS to one minus the estimated PS. [355] In relative weighting, awardee episodes in the post-intervention period are giving a weight of 1, while weights for the other three groups are defined as the relative likelihood of being seen by the awardee in the post-intervention period. [356]

In this report for hospital awardees, we use SMR weights for St. Francis, VUMC and U North Texas, and relative weights for BIDMC, PRHI, J-CHiP, and U Iowa.

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.

[354] Sato, T., & Matsuyama, Y. (2003). Marginal structural models as a tool for standardization. *Epidemiology*, 680-686; Stuart, E. A., Huskamp, H. A., Duckworth, K., Simmons, J., Song, Z., Chernew, M. E., & Barry, C. L. (2014). Using propensity scores in difference-in-differences models to estimate the effects of a policy change. *Health Services and Outcomes Research Methodology*, 14(4), 166-182.

[355] Sato, T., & Matsuyama, Y. (2003). Marginal structural models as a tool for standardization. *Epidemiology*, 680-686.

[356] Stuart, E. A., Huskamp, H. A., Duckworth, K., Simmons, J., Song, Z., Chernew, M. E., & Barry, C. L. (2014). Using propensity scores in difference-in-differences models to estimate the effects of a policy change. *Health Services and Outcomes Research Methodology*, 14(4), 166-182.

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. The following specification is used for the propensity score models:

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

where T_i is the probability of being a treatment group, $\text{Beneficiary-episode}_i$ is a vector of patient characteristics, and Practice/Area_i is a vector of characteristics of the practice or the area for the beneficiary.

We assess and confirm both common support as well as covariate balance between the treatment comparison group patients before and after applying propensity score.[357] 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 four CMMI core measures: total cost of care, hospitalizations, emergency department visits, and hospital readmissions; supplemental measures have been added to individual awardee analyses as appropriate and feasible. Below, we provide details on the specification of each of these measures for the hospital awardees for which analysis has been performed to date.

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.[358] 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 across inpatient providers in our specifications. We include cost related to any visit,

[357] We assess common support by visually inspecting overlap in the distribution of estimated propensity scores across treatment and comparison groups. To assess balance, we compute standardized differences in baseline covariates between treatment and comparison groups. Please see Appendix D for tables of common support and covariate balance in support of propensity score modelling for the awardee chapters.

[358] We apply inflation only to outpatient costs and not to inpatient costs.

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.

Post-discharge Hospitalizations. Defined as the average number of participants with a hospitalization within 90 days of a qualifying (index) hospital discharge per 1,000 hospital discharges. We include hospitalizations for any cause, both planned and unplanned, at any hospital from the Medicare inpatient claims file. The measure excludes 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 hospitalizations within 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 Readmissions are defined as the average number of participants with a re-hospitalization within 30 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 days of discharge.

Practitioner Visit within 7 and 30 Days of Discharge is defined as a practitioner visit occurring within 7 and 30 days of a qualifying (index) hospital discharge per 1,000 hospital discharges. A practitioner 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 addition to calculating utilization measures as binary indicators (i.e. whether or not an event occurred after discharge), we also conduct sensitivity tests of count models to determine whether results differ. If results are significantly different, we include those findings in awardee chapters.

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, practitioner follow-up visits. We also conduct sensitivity analyses with counts of events using Poisson or negative binomial models, with zero-inflation where appropriate.
- **Log-linked model with the appropriate distribution:** For total cost of care. We first convert all costs to 2013 dollars and then use log-linked models with an appropriate distibution (family), as determined by the modified Park test. The appropriate distribution (Gaussian, Poisson, gamma, or inverse Gaussian) allows us to account for the skewed distribution of cost episodes.

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

To answer the research question on program impact, we use Quarterly Fixed Effects DID models.

Quarterly Fixed Effects DID Model. To assess the impact of the program in each quarter of program implementation, comparing the change in outcomes between treatment and comparison group. The QFE DID model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 Treatment_{ij} + \beta_2 Quarters + \beta_3 Treatment_{ij} * \text{Intervention quarters} + \beta_4 Beneficiary\text{-}Episode_{ij} + \varepsilon_{ij}$$

Here we specify time as calendar quarters prior to and subsequent to implementation of the intervention and estimate the average treatment effect in each intervention implementation quarter (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 each post-intervention quarter, after considering the differences between the awardee and comparison groups in the pre-intervention period.

If QFE DID models do not converge due to small sample sizes in particular quarters, we use summative DID models to compare *average* outcomes between the treatment and comparison group over the entire intervention period. The summative model is specified as:

$$Y_{ij} = \beta_0 + \beta_1 Treatment_{ij} + \beta_2 \text{Intervention period} + \beta_3 Treatment_{ij} * \text{Intervention period} + \beta_4 Beneficiary\text{-}Episode_{ij} + \varepsilon_{ij}$$

Here we treat time as two discrete periods—pre- and post-intervention implementation—and estimate the average treatment effect of the program during the post-intervention 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).

The beneficiary-episode covariates included in our DID 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, risk score from an appropriate risk model using all diagnoses one year prior to start of the index episode; 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).[359]

Estimation of Average Quarterly Impact and Aggregate Impact. The two impacts reported for each measure in a hospital analysis, with 90 percent confidence interval, are obtained from QFE DID models, as described above. The *aggregate impacts* are calculated by summing the quarterly impacts, weighted by the number of beneficiary-episodes in the program.[360] Dividing the aggregate impact by the total number of beneficiary-episodes in the program yields the *average quarterly impact.* The average quarterly impacts are presented as the net difference per 1,000 beneficiary-episodes for utilization and quality of care measures and the net difference per beneficiary-episode for total cost of care. The aggregate impacts are presented as the difference in the total number of beneficiary-episodes with events (e.g., episodes with 90-day hospitalizations) across the program for utilization and quality of care measures and the net difference in total cost of care across the program. Net difference is defined as the difference between the

[359] On the CMS HCC Model (2013), See http://www.cms.gov/Medicare/Health-Plans/MedicareAdvtgSpecRateStats/Risk-Adjustors-Items/Risk2013.html. To adjust for differences in morbidity, we use the presence of a major condition and comorbidity (MCC) or conditions and comorbidity (CC).

[360] Quarterly impacts are summed and weighted using Stata's lincom command.

treatment and comparison group beneficiaries in the program period, after accounting for differences noted prior to the program period.

Ambulatory Care (Community) Awardees

Unlike the post-acute interventions, the community 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 with hospital 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. It also includes Alpha-MAX Medicaid data. For the analyses in this report, we include Medicare claims through Mar 31, 2016. The time period for Medicaid claims varies by awardee and source, and are noted in the respective awardee chapters.

Awardee Intervention and Pre-Intervention Groups. Using the finder files provided by the awardees, we identify program participants and their initial enrollment date. We then integrate claims and Medicare/Medicaid enrollment records for all the Medicare/Medicaid 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.

Analytic File Construction. The design of the analytic records includes the following components:

- patient demographics/region;
- beneficiary administrative status at enrollment;
- risk scores and flags such as hierarchical condition categories (HCC) 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 during the quarter.[361]

Comparison Groups. In this report we include a comparison group for all ambulatory care awardees for which a claims-based analysis is presented (e.g, not including CCNC or UAMS). Since UT Houston's design included a randomized control group we have used these control patients as the comparisons group

[361] Includes Medicare Parts A and B payments.

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 community awardees.

Exhibit C.8: Sampling Frame for Comparison Groups, Community Evaluation Design

Awardee	Sampling Frame
CLTCEC	Medicare beneficiaries who are also on MediCal and are part of the IHSS program
CKRI	Medicaid beneficiaries in contiguous geographic regions with similar risk scores
DDHS	Non-institutionalized Medicare FFS patients in the same states, New Jersey and New York, as the DD Health Home program participants.
J-CHiP	Medicare beneficiaries with at least one chronic condition, residing in the same zip codes as the treatment group
JHU SON	Medicare FFS or Medicaid beneficiaries in similar zip codes
LifeLong	MediCAL benefeciaries 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 location as the treatment group
PPMC	Adult Medicaid beneficiaries in Oregon enrolled during the same time period as the Health Commons project not receiving services from the Health Commons programs.
St. Francis	Medicare beneficiaries residing in Hawaii, hospitalized at least one time in 12 months
SCRF	Medicare FFS beneficiaries in contiguous geographic regions with similar risk scores
Sutter Health	Medicare beneficiaries who live in similar geographic areas and/or who died 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
U New Mexico	Adult Medicaid beneficiaries with similar risk scores in New Mexico.
U North Texas (AL)	Medicare beneficiaries who live in AL residences located in counties adjacent to BSLTOC ALs within the same metropolitan area
URI	Medicare beneficiaries with similar trajectories for utilization and cost in RI and CT.
UT Houston	Medicaid beneficiaries in awardee's initial RCT control group
VUMC (Sensitivity analysis)	Medicare beneficiaries discharged immediately after hospitalization from VUMC into a non-participating SNF. Medicare beneficiaries who died during the same time frame.

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 beneficiaries who enroll prior to July 2015 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. The following specification was used for the propensity score models:

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

where T_i is the probability of being in the treatment group, Beneficiary_i is a vector of patient characteristics, and Practice/Area_i is a vector of characteristics of the practice or the area for the beneficiary.

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 Comparison Groups, Community Evaluation Design

Awardee	Propensity Matching Method	Covariates
CLTCEC	Matching	Demographics and disability, risk scores, prior utilization, CDPS scores
CKRI	Matching	Demographics and disability, risk scores, prior utilization, CDPS scores
DDHS	Matching	Demographics and disability, risk scores, prior utilization and cost, and an indicator for depression
J-CHiP	Matching	Demographics and disability, risk scores, prior utilization
JHU SON	Matching	Demographics and disability, risk scores, prior utilization, HCC or CDPS scores
LifeLong	Matching	Demographics and disability, risk scores, prior utilization, CDPS scores
Northland	Mahalanobis Metric Matching§	Demographics and disability, risk scores, prior utilization
PCCSB	Matching	Demographics and disability, risk scores, prior utilization
PPMC	Mahalanobis Metric Matching§	Demographics and disability, risk scores, prior utilization
St. Francis	Matching	Demographics and disability, risk scores, prior utilization
SCRF	Matching	Demographics and disability, risk scores, prior utilization, common HCC flags
Sutter Health	Matching	Demographics and disability, risk scores, prior utilization, common HCC flags
UEMS	Matching	Demographics and disability, risk scores, prior utilization
U New Mexico	Matching	Demographics, dual coverage, a measure of comorbidity (the JEN Frailty Score), prior utilization and days covered under Medicaid in the previous year.
U North Texas (AL)	Matching	Demographics, comorbidities, prior utilization and cost
URI	Matching	Demographics and disability, risk scores, prior utilization, CDPS scores
UT Houston	No propensity approach used because data is from a randomized control trial	
VUMC (Sensitivity analysis)	Matching	Demographics and disability, risk scores, prior utilization

NOTE: §In Mahalanobis metric matching, we specify a set of variables and calculate the Mahalanobis distance between the treatment and comparison group members.[362] The comparator with the smallest distance is selected as the match. By combining Mahalanobis distance along with propensity scores, we improve the rigor of the matching process.[363]

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.[364] Further analyses of the effects of the treatment are conducted with the treatment group and the weighted comparison group.

[362] Mahalanobis distance uses complete variance and covariance matrix for a set of variables such as prior hospitalizations, ED visits and cost of care, such that the relationship between these variables is considered in determining the best match.

[363] Rubin DB, Thomas N. Combining propensity score matching with additional adjustments for prognostic covariates. Journal of the American Statistical Association. 2000;95:573–585; Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward. *Statistical science: a review journal of the Institute of Mathematical Statistics*, *25*(1), 1.

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

Measure Specification

In this report our results focus on the four CMMI core measures, defined in the section above on our hospital evaluation design. Our approach for community awardees is similar but is based on beneficiaries as the unit of analysis, rather than episode. Time is defined as exposure time to the intervention, rather than calendar time. We report the following measures for ambulatory awardees for each beneficiary-quarter prior and subsequent to enrollment in the intervention:

- Total Medicare cost of care per quarter: average (mean) Medicare costs per beneficiary, expressed in 2013 dollars, inflated for any partial quarters of enrollment.
- All-cause hospitalizations per quarter: number of participants with hospitalizations per 1,000 beneficiaries
- ED visits per quarter: number of participants with ED visits or observation stays (not resulting in inpatient hospitalizations) per 1,000 beneficiaries
- Readmissions per quarter: number of participants with 30-day readmission per 1,000 beneficiaries
- Hospitalizations for ambulatory care sensitive conditions (ACS hospitalizations) per quarter: number of participants admitted to a short-term inpatient facility for ACS conditions per 1,000 beneficiaries.[365] If the AHRQ ACS algorithm cannot be run on Medicaid claims, we report potentially avoidable hospitalizations for such awardees.[366]

In addition to calculating core measures as binary indicators (i.e. whether or not an event occurred in that patient quarter), we also conduct sensitivity tests of count models to determine whether results differ. If results are significantly different, we include those findings in awardee chapters.

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 outcome measures detailed above for each of the eight beneficiary-quarters prior to enrollment and all beneficiary-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.

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[365] Agency for Healthcare Research and Quality. Prevention quality chronic composite technical specifications; prevention quality indicators #92; May 2013. Available at: http://www.qualityindicators.ahrq.gov/Downloads/Modules/PQI/V45/TechSpecs/PQI%2092%20Prevention%20Quality%20Chronic%20Composite.pdf.

[366] Segal, M., Rollins, E., Hodges, K., & Roozeboom, M. (2014). Medicare-Medicaid eligible beneficiaries and potentially avoidable hospitalizations. *Medicare & Medicaid research review*, *4*(1).

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

- **Binomial distribution with log-link:** For likelihood of hospitalizations, ED visits, readmissions, and ACS hospitalizations. We also conduct sensitivity analyses with counts of events using Poisson or negative binomial models, with zero-inflation where appropriate.
- **Log-linked model with the appropriate distribution:** For total cost of care. We first convert all costs to 2013 dollars and then use log-linked models with an appropriate distibution (family), as determined by the modified Park test. The appropriate distribution (Gaussian, Poisson, gamma, or inverse Gaussian) allows us to account for the skewed distribution of cost across beneficiary-quarters. For awardees with a large proportion of beneficiary-quarters with zero costs, we use two-part models. The first part of the two part model was a probit model that predicted the probability of a beneficiary-quarter having non-zero costs, while the second part predicted the cost for beneficiary-quarters with non-zero costs using a log-linked model with an appropriate 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, we use DID models described below.

To assess the impact of the program in each quarter after enrollment in the intervention, we compare the change in outcomes between treatment and comparison group using quarterly-fixed effects (QFE) DID model. The QFE DID model is specified as:

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

Here we specify time as calendar quarters prior to and subsequent to enrollment in the intervention and estimate the average treatment effect in each intervention quarter (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).

If QFE DID models do not converge due to small sample sizes in particular quarters, we use summative DID models to compare *average* outcomes between the treatment and comparison group over the entire intervention enrollment period. The summative model is specified as:

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

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-intervention 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).

The beneficiary-level covariates included in our DID models include beneficiary's age, gender, race, dual eligibility status, and disability status at the time of the program enrollment. We also include covariates for comorbidities, using risk score from an appropriate risk model for all diagnoses one year prior to a beneficiary's enrollment in the program.

Estimation of Average Quarterly Impact and Aggregate Impact. The two impacts reported for each measure in a community analysis, with 90 percent confidence interval, are obtained from QFE DID models, as described above. The *aggregate impacts* are calculated by summing the quarterly impacts, weighted by the number of beneficiaries in the program. [367] Dividing the aggregate impact by the total number of beneficiaries in the program yields the *average quarterly impact.* The average quarterly impacts are presented as the net difference per 1,000 beneficiaries for utilization and quality of care measures and the net difference per beneficiary for total cost of care. The aggregate impacts are presented as the difference in the total number of beneficiaries with events (e.g., episodes with 90-day hospitalizations) across the program for utilization and quality of care measures and the net difference in total cost of care across the program. Net difference is defined as the difference between the treatment and comparison group beneficiaries in the program period, after accounting for differences noted prior to the program period.

[367] Quarterly impacts are summed and weighted using Stata's lincom command.

Appendix D: Claims-based Analyses: Supporting Exhibits

Overview

This appendix provides technical exhibits that support the Difference-in-Difference (DID) analyses in 20 awardee chapters, as follows:

- Displays of the test of common support and covariate balance for analyses in which propensity score matching or weighting is used as part of comparison group creation. We use three types of propensity score estimation: matching, relative weighting, and standardized mortality ratio (SMR) weighting.
- Charts that present quarterly fixed effects (QFE) findings for an intervention's impact by quarter, for awardee chapters where these findings are not central to our evaluation of program effectiveness.

In addition, selected claims-based subgroup analyses are presented in this appendix, for CLTCEC (time-series analysis), J-CHiP (subgroup analyses for hospital arm discharge to SNF and community arm by program and dose), and Sutter Health (subgroup analysis for all beneficiaries), as noted in the corresponding awardee chapter.

Please see Appendix C for more information about analytic approaches. Exhibit D.1 lists the awardees for whom tests of common support and covariate balance are presented in this appendix. Exhibit D.2 lists the awardees for whom QFE charts are presented in this appendix.

Exhibit D.1: Analyses that Include Common Support and Covariance Balance Charts by Awardee

Awardee	Evaluation Design	Payer	Propensity Score Model
BIDMC	Hospital	Medicare	Relative weighting
CLTCEC	Community	Medicare	Matching
		Medicaid	
CKRI	Community	Medicare	Matching
	Community	Medicaid	Matching
DDHS	Community	Medicare	Matching
		Medicaid	Matching
J-CHiP	Hospital	Medicare	Relative weighting
		Medicaid	
	Community	Medicare	Matching
		Medicaid	
JHU SON	Community	Medicare	Matching
		Medicaid	Matching
LifeLong	Community	Medicaid	Matching
Northland	Community	Medicare	Matching
PCCSB	Community	Medicare	Matching
PRHI	Hospital	Medicare	Relative weighting
PPMC	Community	Medicaid	Matching
St. Francis	Hospital	Medicare	SMR weighting
	Community	Medicare	Matching
SCRF	Community	Medicare	Matching
Sutter Health	Community	Medicare	Matching
UEMS	Community	Medicaid	Matching
U Iowa	Hospital	Medicare	Relative weighting
U New Mexico	Community	Medicaid	Matching
U North Texas	Hospital	Medicare	SMR weighting
	Community	Medicare	Matching
URI	Community	Medicare	Matching
VUMC	Hospital	Medicare	SMR weighting
	Community	Medicare	Matching

Exhibit D.2: Analyses that Include Quarterly Fixed Effects Charts of the Impact of HCIA-Funded Innovations on Outcomes by Quarter by Awardee

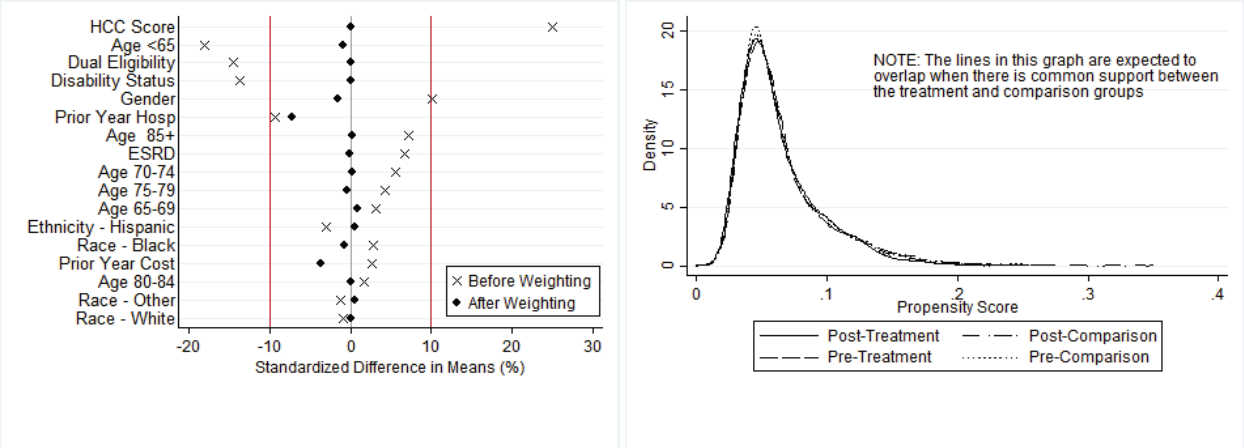
Awardee	Evaluation Design	Outcome Measures							QFE Charts Included in Awardee Chapter?
		CMMI Core Measures				Supplemental Measures			
		Hospitalizations	ED Visits	Readmissions	Total Cost of Care	Ambulatory Care-sensitive Hospitalizations	Potentially Avoidable Hospitalizations	Practitioner Follow-up Visits	
BIDMC	Hospital	X	X	X	X			X	No
CLTCEC	Community, Medicare	X	X	X	X	X			ED Visits, Total Cost of Care
	Community, Medicaid	X	X						No
CKRI	Community, Medicare	X	X		X				Total Cost of Care
	Community, Medicaid	X	X		X				No
DDHS	Community, Medicare	X	X	X	X	X			No
	Community, Medicaid	X	X		X				No
J-CHiP	Hospital, Medicare	X	X	X	X			X	No
	Hospital, Medicaid	X	X	X	X			X	No
	Community, Medicare	X	X	X	X	X			Total Cost of Care
	Community, Medicaid	X	X	X	X		X		No
JHU SON	Community, Medicare	X	X	X	X	X			ED Visits, Readmissions, Total Cost of Care
	Community, Medicaid	X	X		X				All
Northland	Community	X	X	X	X	X			No
PCCSB	Community	X	X	X	X	X			No
PRHI	Hospital	X	X	X	X			X	No
PPMC	Community	X	X		X				No
St. Francis	Hospital	X	X	X	X			X	No
	Community	X	X	X	X	X			No
SCRF	Community	X	X	X	X	X			Hospitalizations, ED Visits, Total Cost of Care
Sutter Health	Community	X	X	X	X	X			No
	EOL	X	X		X				No
UEMS	Community	X	X		X		X	X	Hospitalizations, Practitioner Follow-up Visits
U Iowa	Hospital	X	X	X	X			X	No
U New Mexico	Community	X	X	X	X		X		All
U North Texas	Hospital	X	X	X	X				No
	Community	X	X	X	X	X			No
URI	Community	X	X		X	X			All
VUMC	Hospital	X	X	X	X			X	ED Visits
	Community	X	X	X	X	X			No

Beth Israel Deaconess Medical Center

Exhibit D.BIDMC.1 presents common support and covariate balance across PACT post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes.

- After relative weighting, we observe a high level of overlap in the distribution of estimated propensity scores across PACT post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes (left graph).
- On the balance graph (right graph), we are able to show that the standardized difference between PACT post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes across all covariates is negligible after incorporating relative weights.

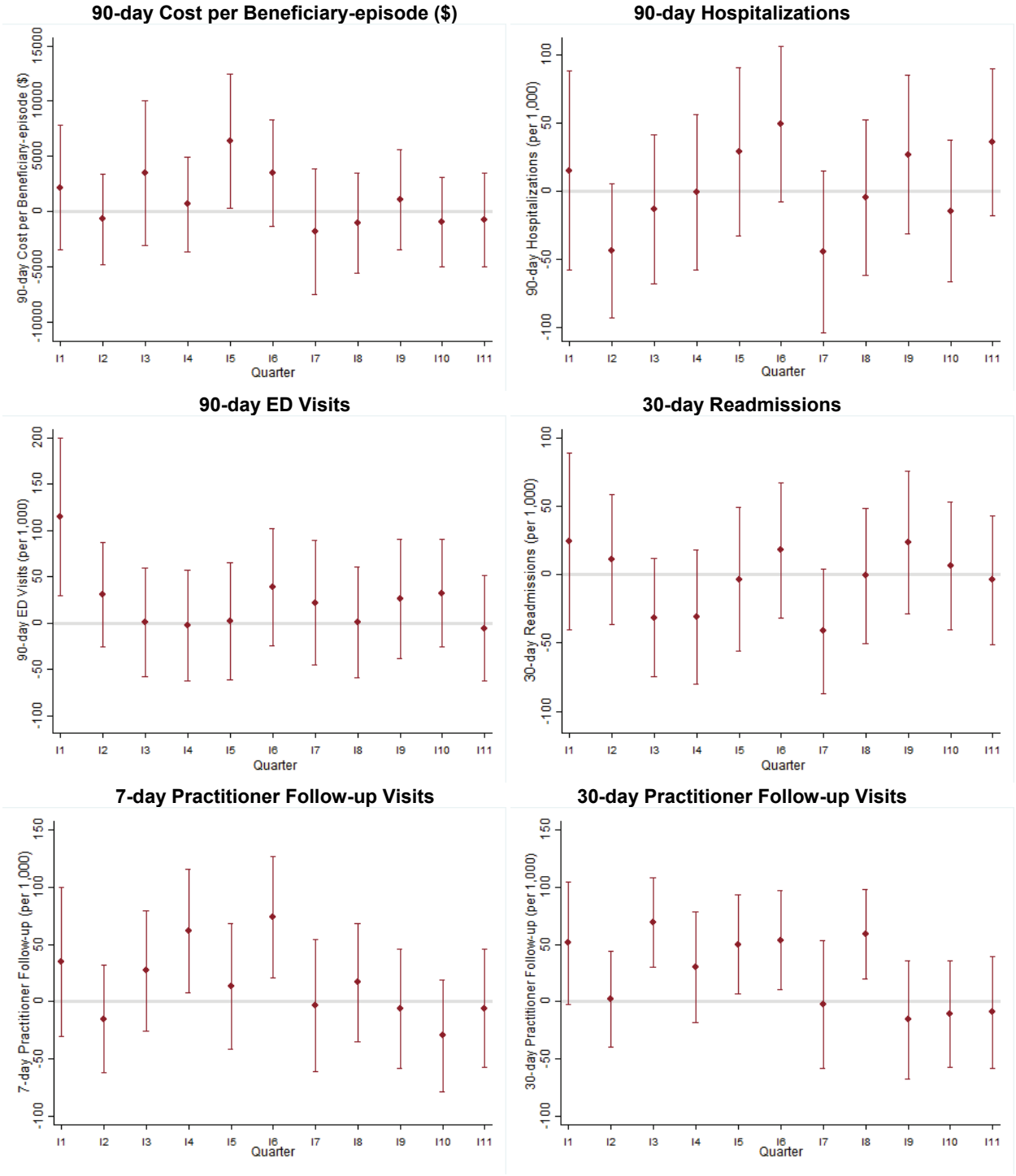
Exhibit D.BIDMC.1: Common Support and Covariate Balance for PACT and Comparison Beneficiary-Episodes



Impact of PACT Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.BIDMC.2 displays the results of the quarterly fixed effects DID models.[368]

[368] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I11) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.BIDMC.2: Impact of the PACT Program on Outcomes by Quarter



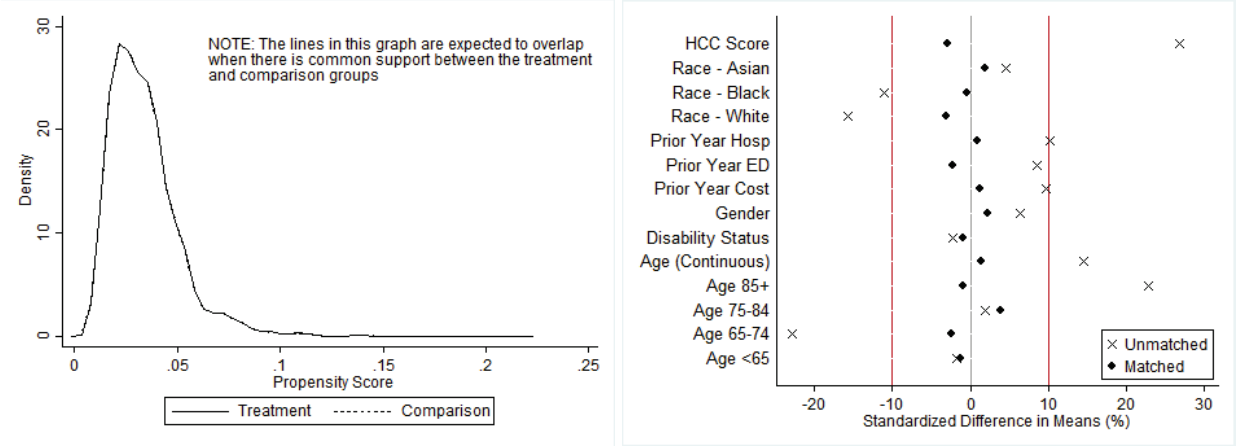
California Long-Term Care Education Center

Medicare Analysis

Exhibit D.CLTCEC.1 presents common support and covariate balance across CLTCEC Medicare treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between CLTCEC participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

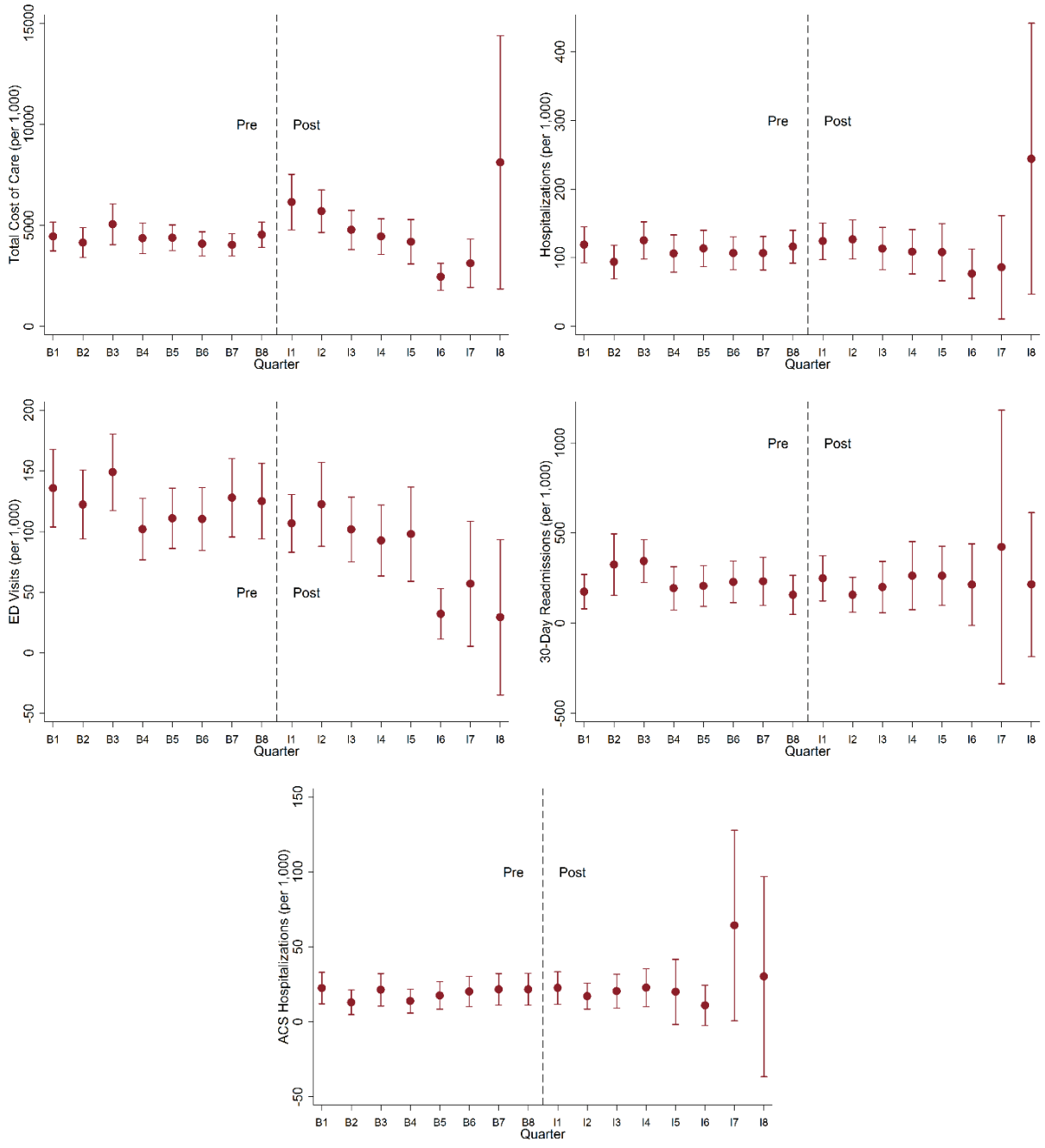
Exhibit D.CLTCEC.1: Common Support and Covariate Balance for CLTCEC and Comparison Participants, Medicare Analysis



Impact of CLTCEC Program: Time-Series Analysis, Medicare. Exhibit D.CLTCEC.2 displays the adjusted average quarterly utilization rates and cost for CLTCEC participants. Estimates are reported as count measures, indicating the number of events that occurred in each quarter across beneficiaries. We find the following for the CLTCEC program, relative to the comparison group:

- **Cost:** A decreasing trend in quarter cost of care.
- **Utilization Measures:** No trend in hospitalizations or 30-day readmissions. For ED visits, there is a decreasing trend across the entire post-intervention period.
- **Quality of Care:** No trend in ACS hospitalizations across the post-intervention period.

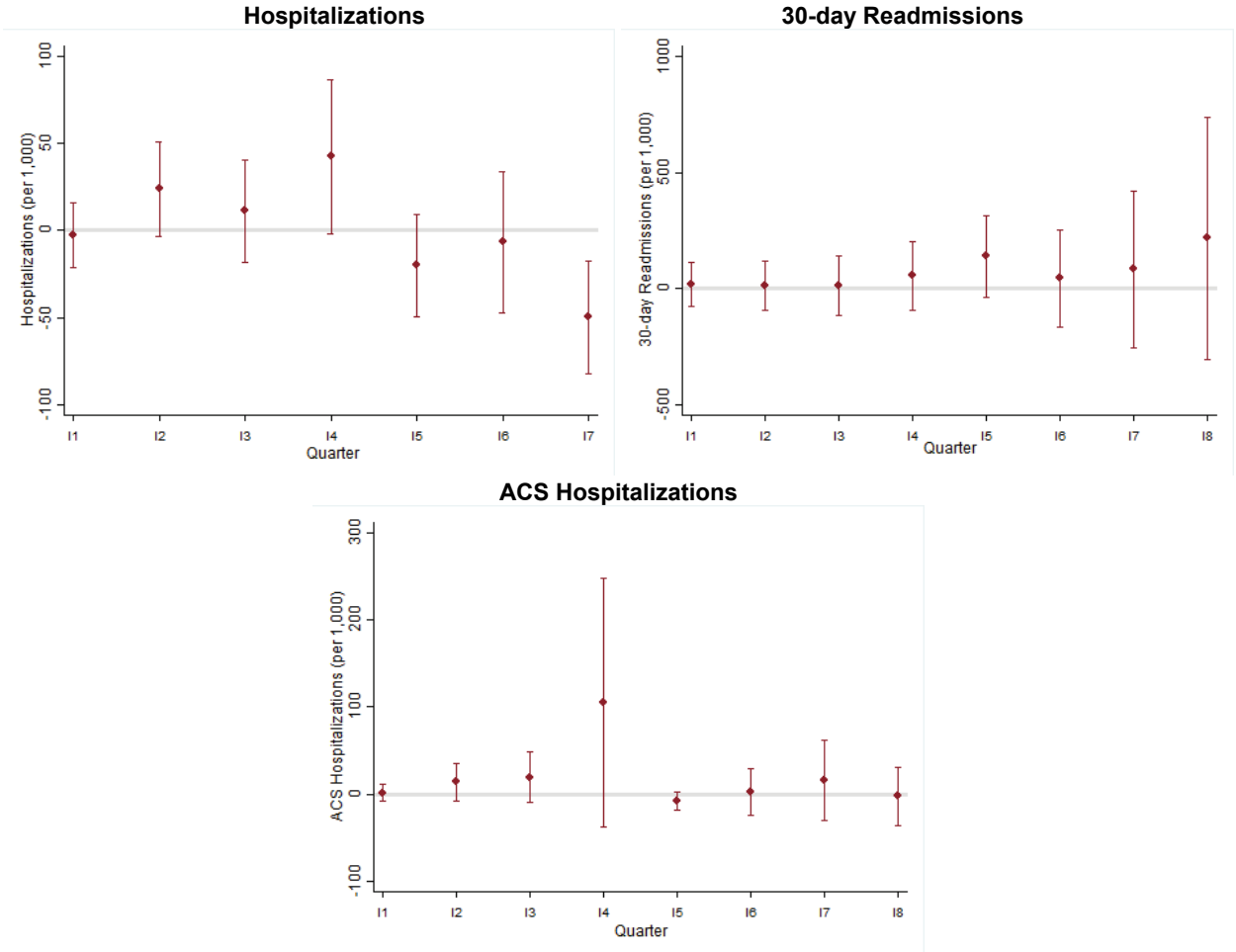
Exhibit D.CLTCEC.2: Adjusted Rates for Measures for CLTCEC Participants, by Quarter



Impact of CLTCEC Program in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter for hospitalizations, readmissions, and ACS hospitalizations are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.CLTCEC.3 displays the results of the quarterly fixed effects DID

models.[369] Findings from the QFE models for total cost of care and ED visits departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

Exhibit D.CLTCEC.3: Impact of the CLTCEC Program on Outcomes by Quarter, Medicare Analysis



Medicaid Analysis

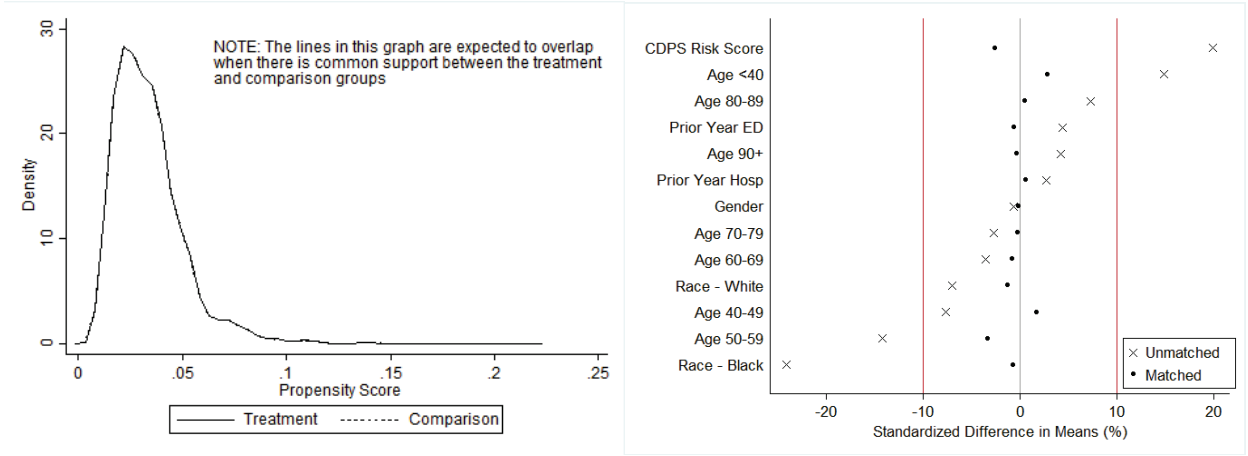
Exhibit D.CLTCEC.4 presents common support and covariate balance across CLTCEC Medicaid treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.

[369] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between CLTCEC participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.CLTCEC.4: Common Support and Covariate Balance for CLTCEC and Comparison Participants, Medicaid Analysis



Impact of CLTCEC Program in Each Quarter of Enrollment, Medicaid Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibits D.CLTCEC.5, D.CLTCEC.6, D.CLTCEC.7, and D.CLTCEC.8 display the results of the quarterly fixed effects DID models for hospitalizations and ED visits.[370]

We received data from six health plans; three of these plans (Molina, ContraCosta, and LA Care) are represented below in the QFE charts. Two of the plans did not have a large enough sample size for quarterly analysis, and the remaining plan's data was of too low quality to be included for these analyses.

[370] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I6) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.CLTCEC.5: Impact of the CLTCEC Program on Outcomes by Quarter, Medicaid Analysis: Molina Health Plan

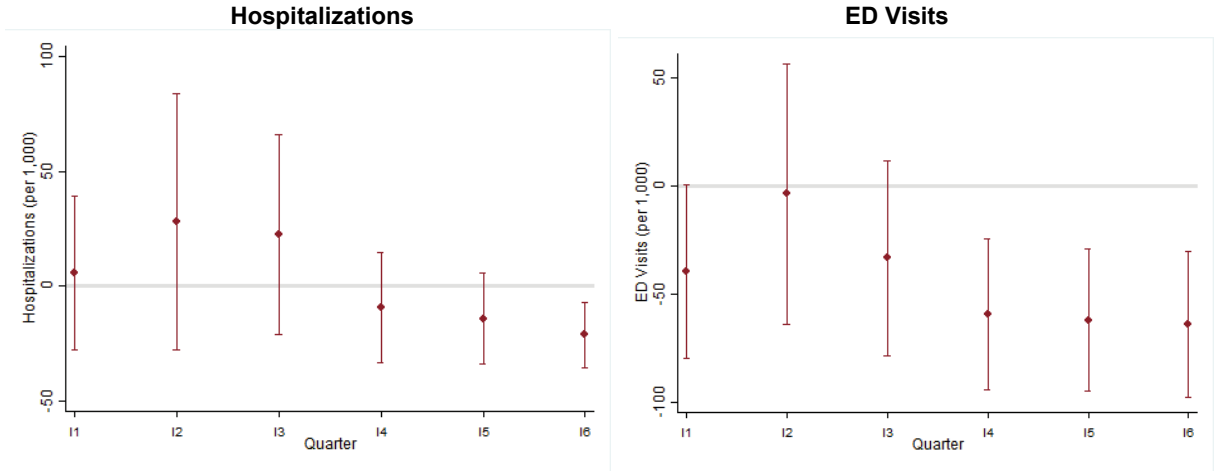


Exhibit D.CLTCEC.6: Impact of the CLTCEC Program on Outcomes by Quarter, Medicaid Analysis: Contra Costa Health Plan

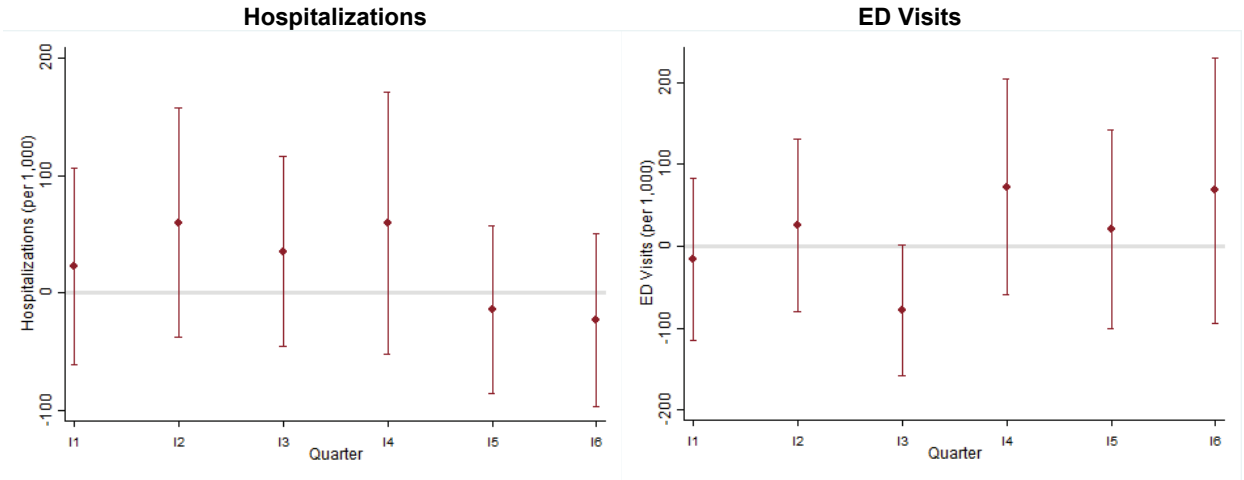


Exhibit D.CLTCEC.7: Impact of the CLTCEC Program on Outcomes by Quarter, Medicaid Analysis: LA CARE Health Plan

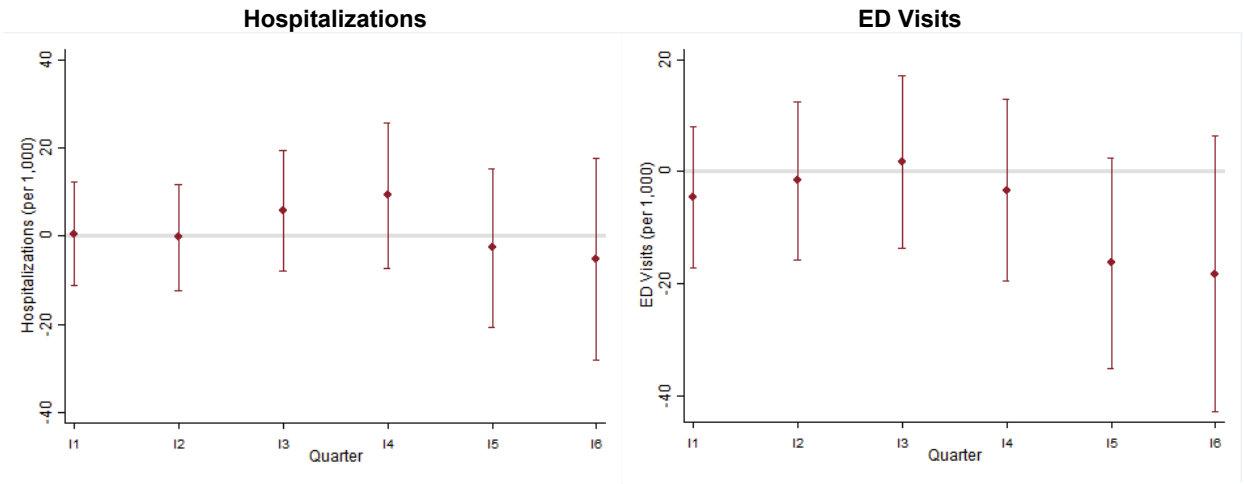
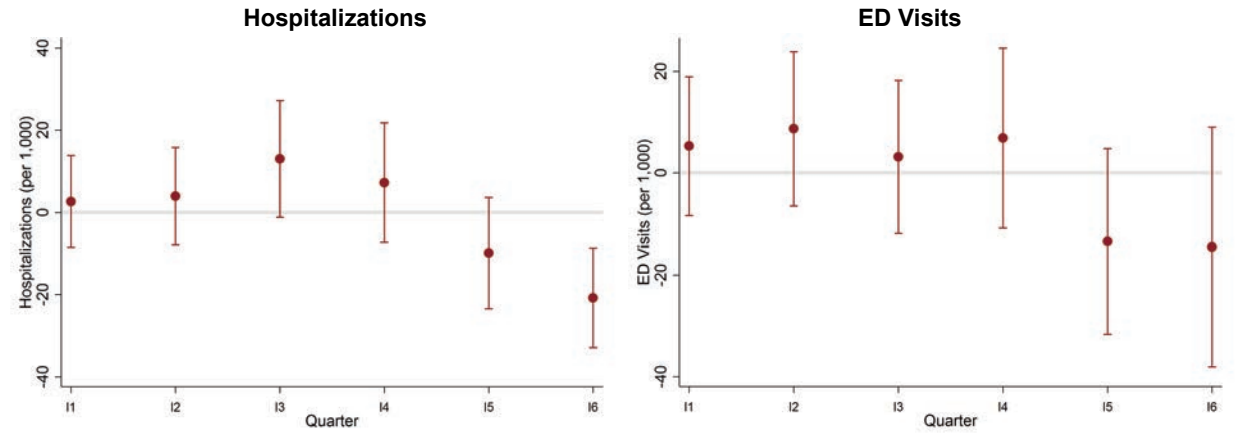


Exhibit D.CLTCEC.8: Impact of the CLTCEC Program on Outcomes by Quarter, Medicaid Analysis: All Health Plans (Pooled)



Impact of the CLTCEC Program. Exhibit D.CLTCEC.9 displays the average quarterly and aggregate impact of the CLTCEC program on its participants relative to the comparison group, for all plans individually as well as pooled.[371] We report utilization measures as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary (beneficiary-quarter).[372] We find the following for the CLTCEC program, relative to the comparison group:

- **Utilization Measures:** A significant decrease in ED visits for participants in the Molina plan of 23 per 1,000 beneficiaries per quarter, relative to a comparison group. Non-significant decreases for LA

[371] Adjustment factors include age category, gender, race/ethnicity, extent of FFS coverage, risk score, and indicator for graduating class.

[372] See Appendix C for more information on our analysis. In addition to binary measures, we also conduct tests using counts of utilization and report those results where relevant.

Care for both hospitalizations and ED visits; non-significant decrease in hospitalizations for the all CLTCEC beneficiaries (pooled analysis).

Exhibit D.CLTCEC.9: Overall Impact of the CLTCEC Program on Outcomes by Quarter, Medicaid Analysis

AVERAGE QUARTERLY IMPACT§				
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate (90% Confidence Interval)**			
	Pooled (All Plans)	**LA Care**	**Molina**	**Contra Costa**
N	**2,708**	**2,340**	**246**	**122**
Hospitalizations	-2 [-8, 4]	-3 [-9, 3]	-2 [-17, 13]	21 [-16, 58]
ED Visits	1 [-7, 9]	-4 [-11, 3]	**-23 [-42, -4]****	12 [-43, 67]
AGGREGATE IMPACT§§				
Outcome Measure	**Adjusted Estimate (90% Confidence Interval)**			
Hospitalizations	-20 [-83, 43]	-25 [-72, 22]	-3 [-19, 13]	13 [-11, 37]
ED Visits	8 [-74, 90]	-30 [-86, 26]	**-25 [-46, -4]****	8 [-27, 43]

NOTE: *p<0.10, **p<0.05, ***p<0.01. §Quarterly Impact is the average quarterly DID estimate per quarter of program enrollment. §§Aggregate Impact is the total DID estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants and length of program enrollment.

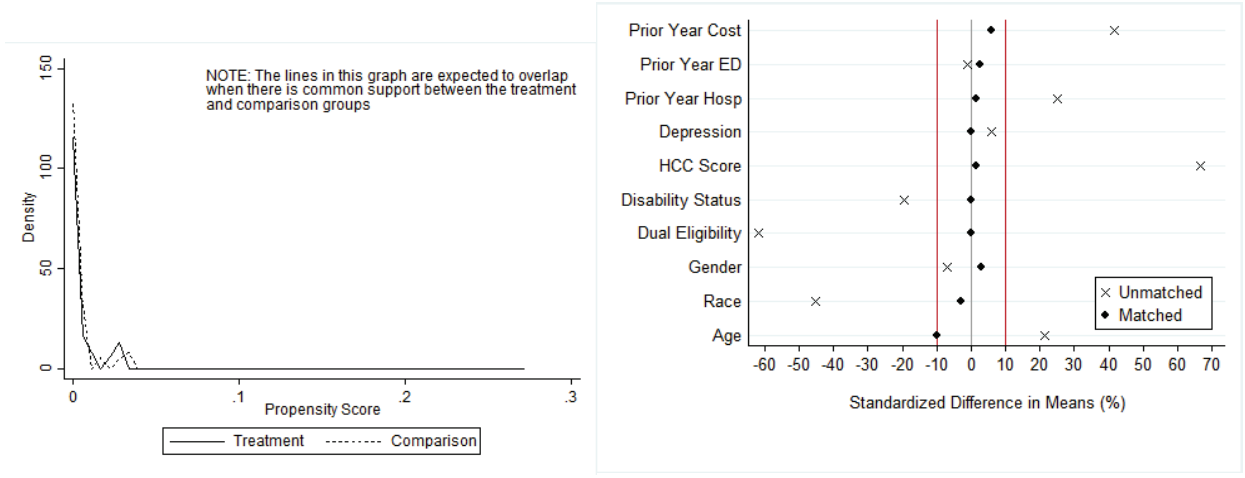
Courage Kenny Rehabilitation Institute

Medicare Analysis

Exhibit D.CKRI.1 presents common support and covariate balance across CKRI Medicare treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between CKRI participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.CKRI.1: Common Support and Covariate Balance for CKRI and Comparison Participants, Medicare Analysis

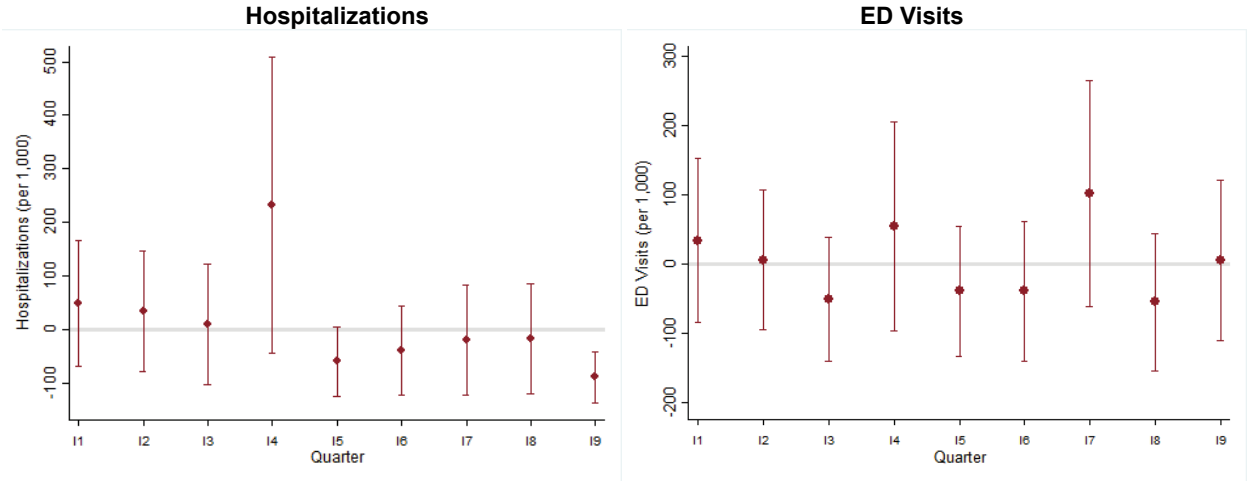


Impact of CKRI Program in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter for hospitalizations and ED visits are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.CKRI.2 displays the results of the quarterly fixed effects DID models.[373] Findings from the QFE model for total cost of care departed from the quarterly and aggregate results and thus we present and discuss them in the awardee chapter. [374]

[373] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

[374] In post-intervention quarter four (I4) of the hospitalizations analysis, there were only two admissions out of 61 persons in the comparison group, and seven admissions out of 37 admissions in the treatment group. In post-intervention quarters four (I4) and seven (I7), there were fewer than 10 ED visits: (7/63) and (8/57) in the comparison group and (7/44) and (8/36) in the treatment group.

Exhibit D.CKRI.2: Impact of the CKRI Program on Outcomes by Quarter, Medicare Analysis

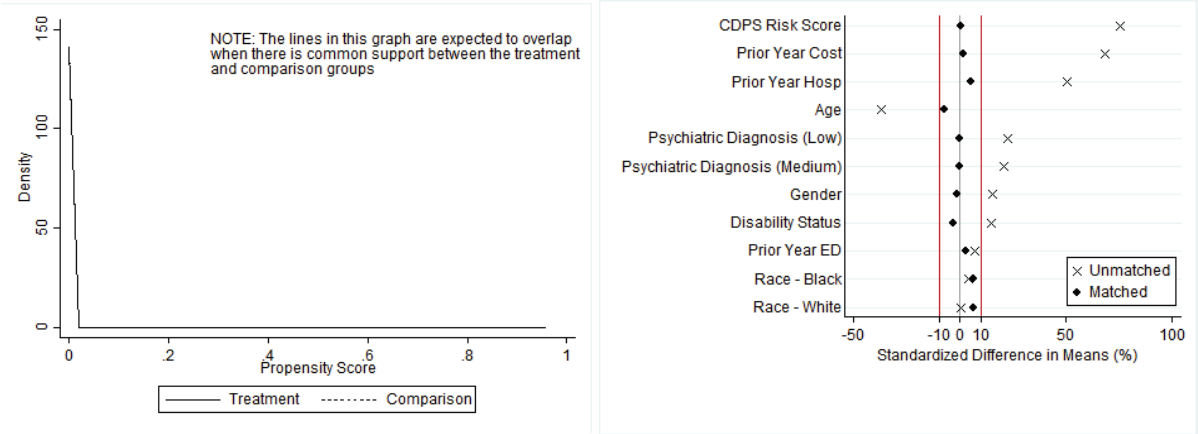


Medicaid Analysis

Exhibit D.CKRI.3 presents common support and covariate balance across CKRI Medicaid treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between CKRI participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

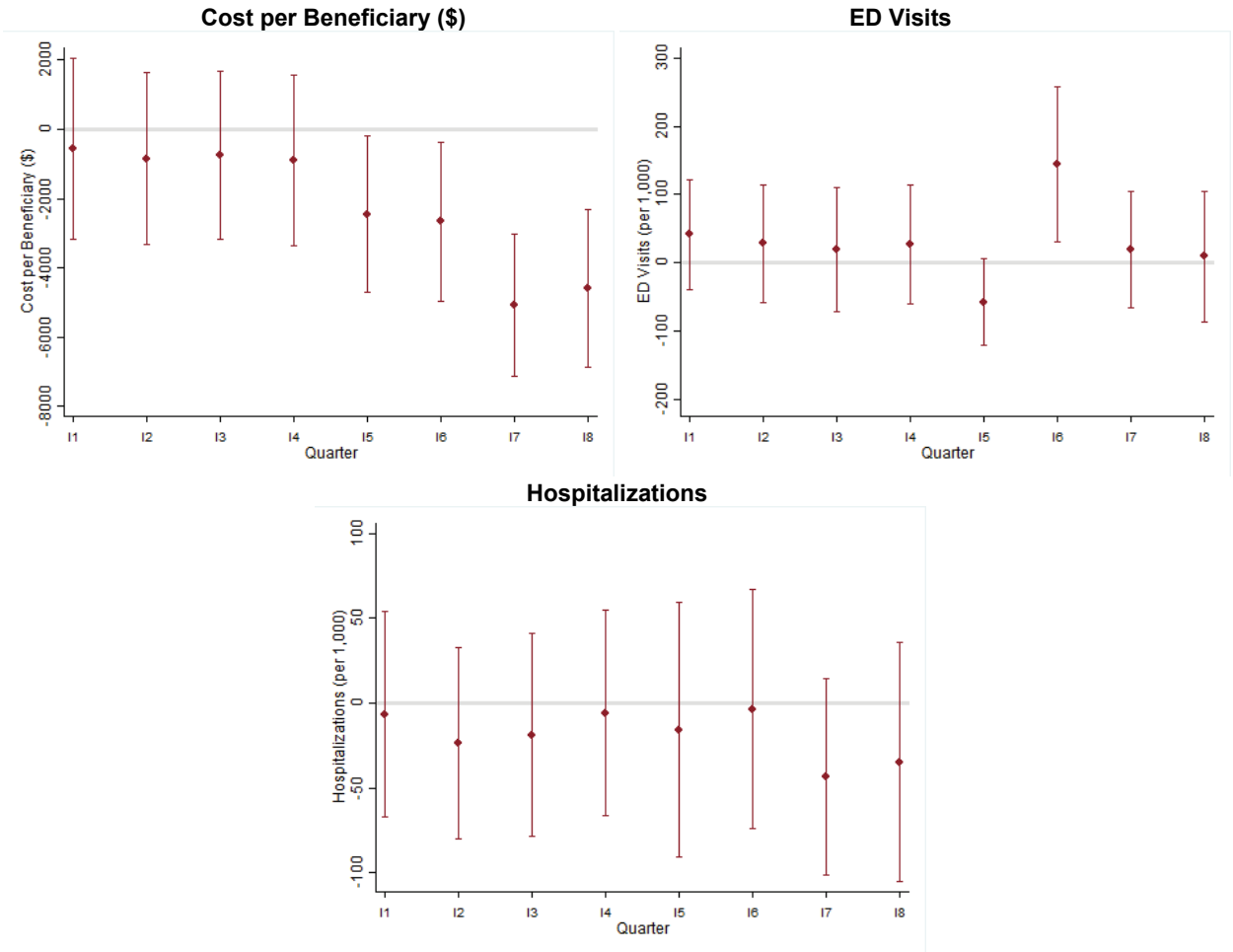
Exhibit D.CKRI.3: Common Support and Covariate Balance for CKRI and Comparison Participants, Medicaid Analysis



Impact of CKRI Program in Each Quarter of Enrollment, Medicaid Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly

impacts summarized in the awardee chapter.[375] Exhibit D.CKRI.4 displays the results of the quarterly fixed effects DID models.

Exhibit D.CKRI.4: Impact of the CKRI Program on Outcomes by Quarter, Medicaid Analysis



[375] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

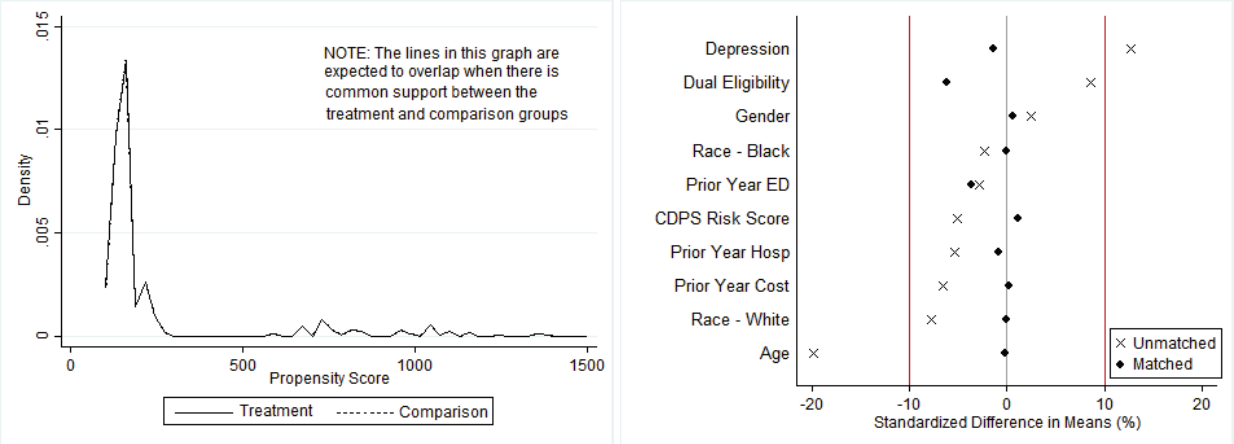
Developmental Disabilities Health Services

Medicare Analysis

Exhibit D.DDHS.1 presents common support and covariate balance across DD Health Home Medicare treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between DD Health Home participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

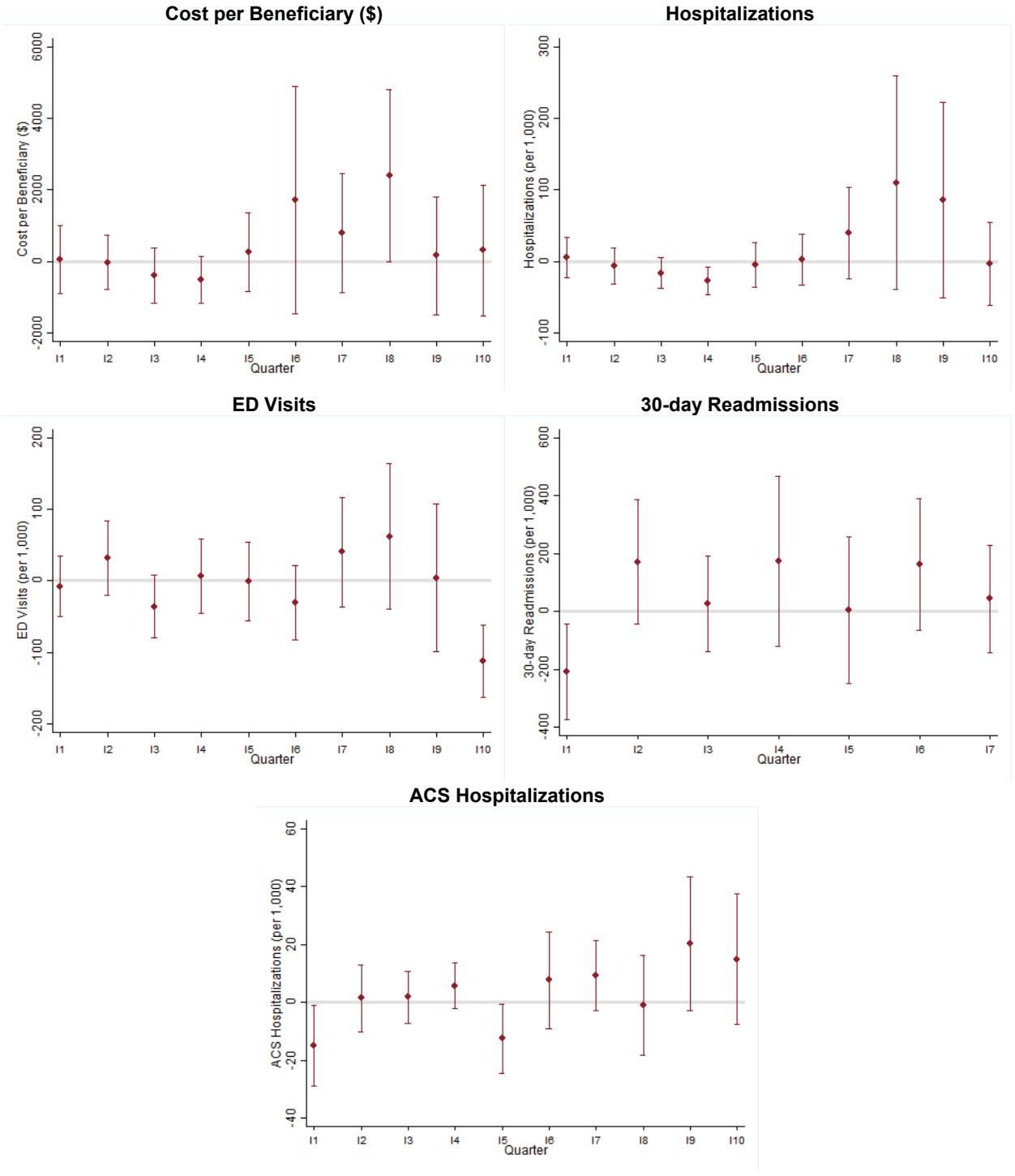
Exhibit D.DDHS.1: Common Support and Covariate Balance for DD Health Home and Comparison Participants, Medicare Analysis



Impact of DD Health Home Program in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.DDHS.2 displays the results of the quarterly fixed effects DID models.[376]

[376] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I10) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.DDHS.2: Impact of the DD Health Home Program on Outcomes by Quarter, Medicare Analysis

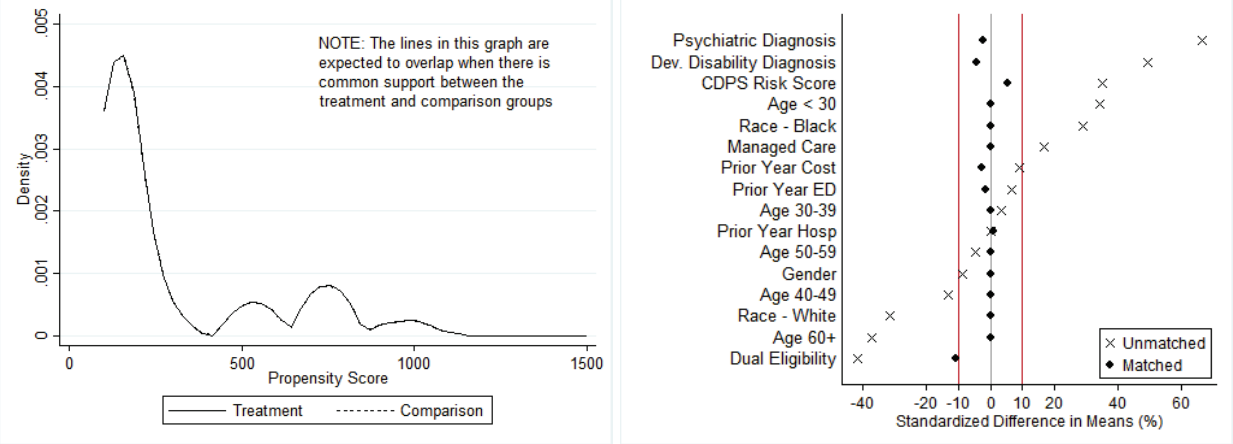


Medicaid Analysis

Exhibit D.DDHS.3 presents common support and covariate balance across DD Health Home Medicaid treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between DD Health Home participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph). Although we were not able to achieve balance on the dual eligibility indicator, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

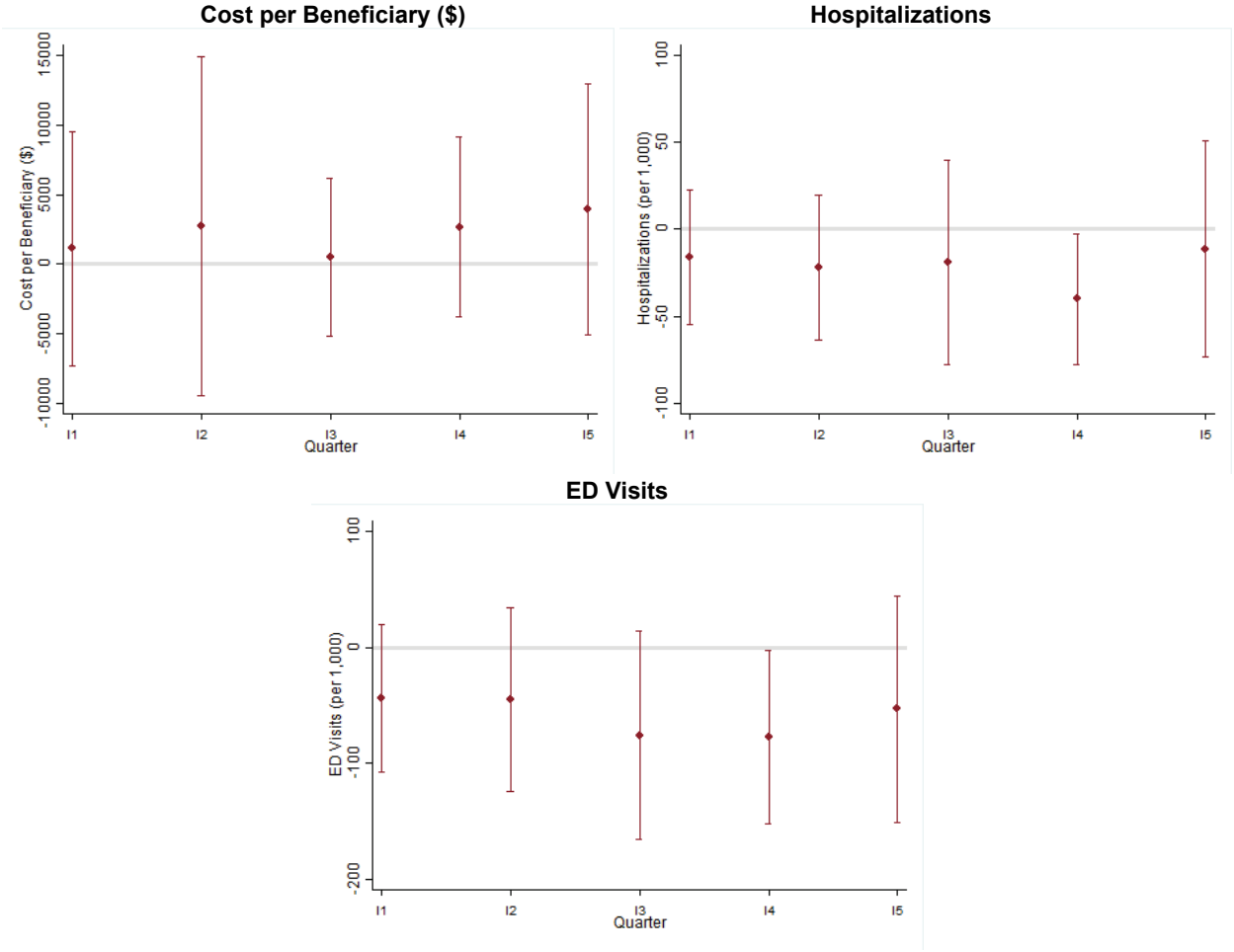
Exhibit D.DDHS.3: Common Support and Covariate Balance for DD Health Home and Comparison Participants, Medicaid Analysis



Impact of DD Health Home Program in Each Quarter of Enrollment, Medicaid Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.DDHS.4 displays the results of the quarterly fixed effects DID models.[377]

[377] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I5) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.DDHS.4: Impact of the DD Health Home Program on Outcomes by Quarter, Medicaid Analysis



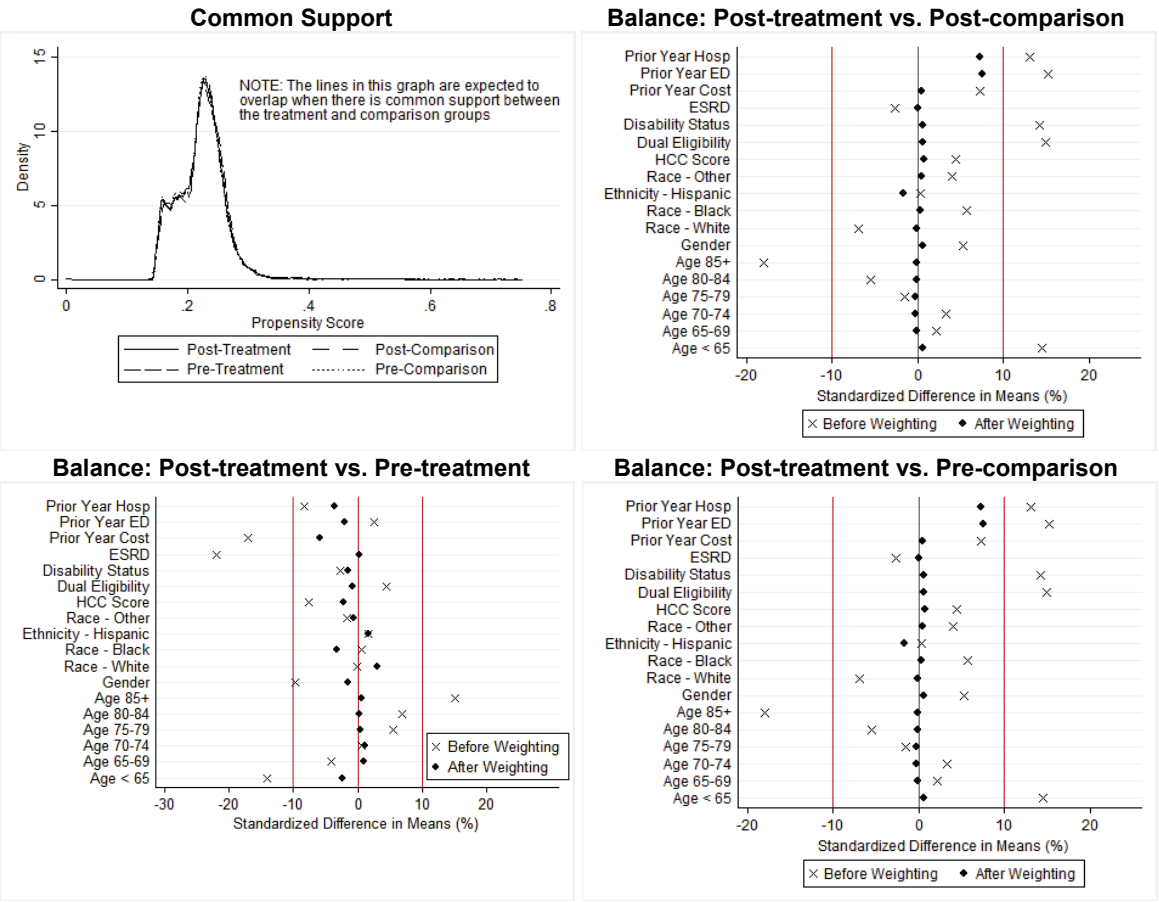
Johns Hopkins University

Hospital Arm, Medicare Analysis

Exhibit D.J-CHiP.1 presents common support and covariate balance across J-CHiP Medicare post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes.

- After relative weighting, we observe a high level of overlap in the distribution of estimated propensity scores across J-CHiP post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes (top left graph).
- On the balance graphs, we are able to show that the standardized difference between J-CHiP post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes across all covariates is negligible after incorporating relative weights.

Exhibit D.J-CHiP.1: Common Support and Covariate Balance for J-CHiP and Comparison Beneficiary-Episodes, Medicare Analysis

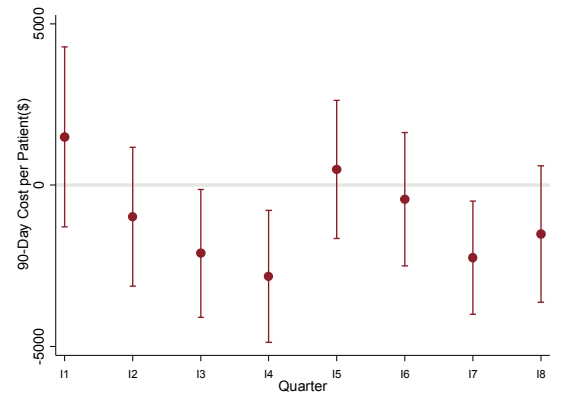


Impact of J-CHiP Hospital Arm in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.J-CHiP.2 displays the results of the quarterly fixed effects DID models.[378]

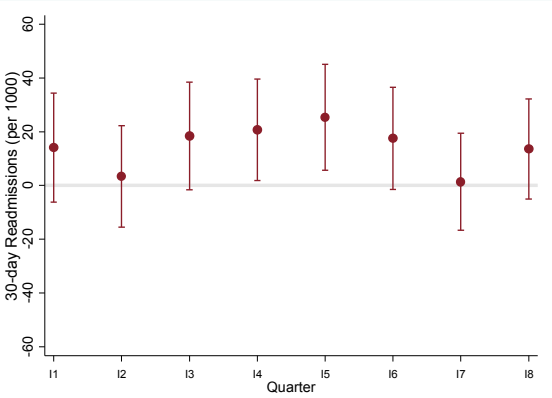
[378] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.J-CHiP.2: Impact of the J-CHiP Hospital Arm on Outcomes by Quarter, Medicare Analysis

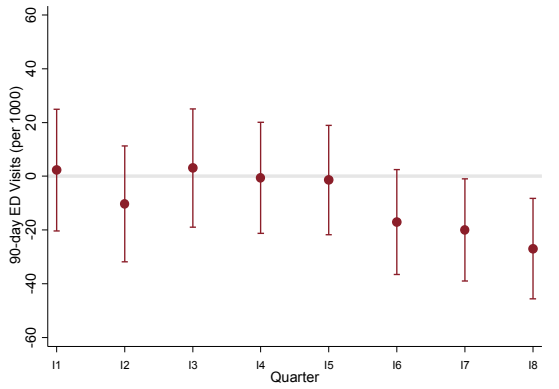
90-day Cost per Beneficiary-episode ($)



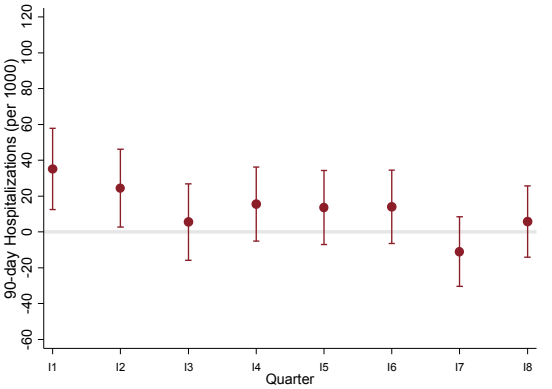
30-day Readmissions



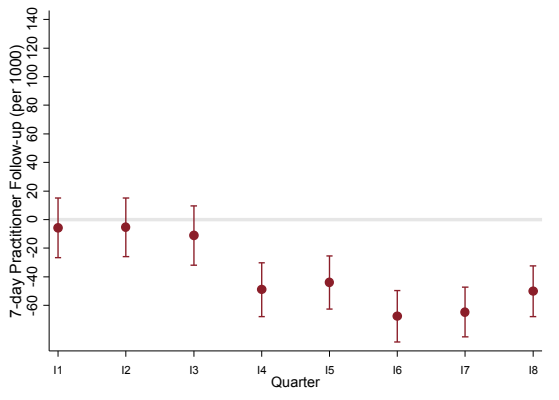
90-day ED Visits



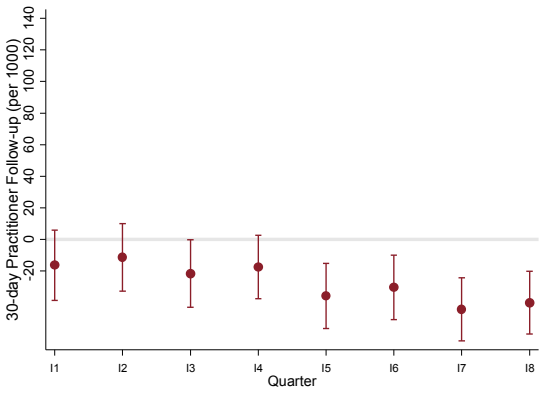
90-day Hospitalizations



7-day Practitioner Follow-up Visits



30-day Practitioner Follow-up Visits



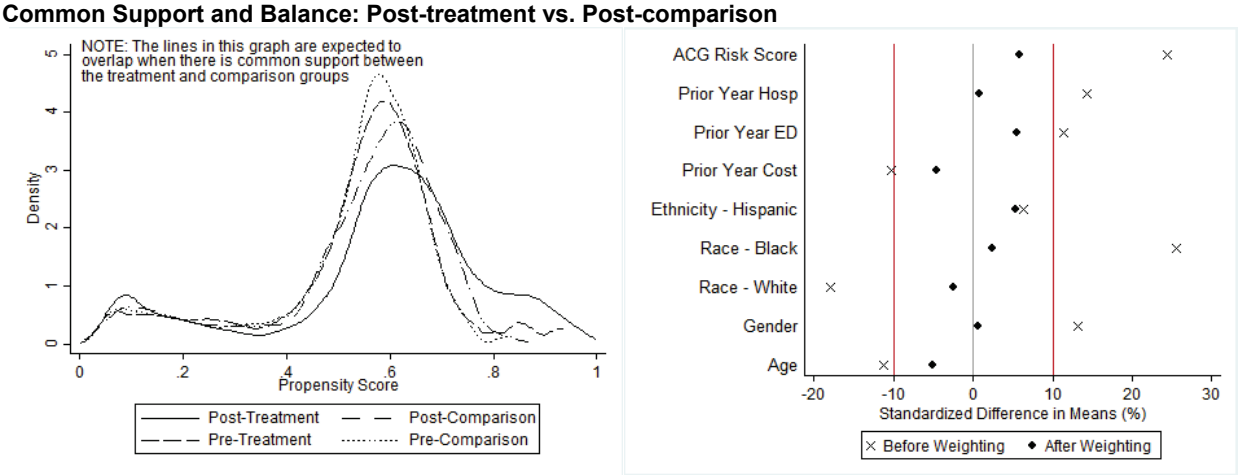
Hospital Arm, Medicaid Analysis

Exhibits D.J-CHiP.3 and D.J-CHiP.4 present common support and covariate balance across J-CHiP Medicaid post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes for both dually eligible and non-dually eligible beneficiaries in the hospital arm.

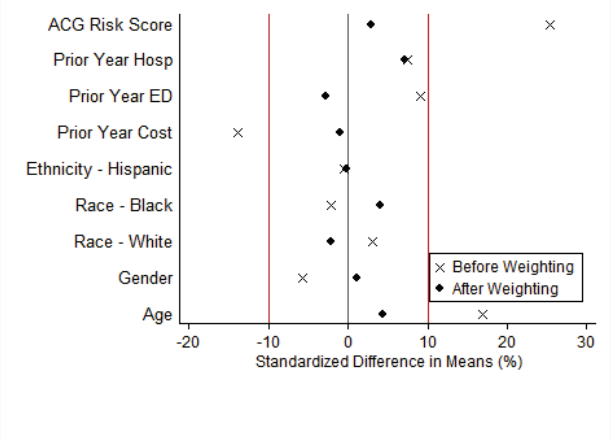
- After relative weighting, we observe a high level of overlap in the distribution of estimated propensity scores across J-CHiP post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes (top left graph).
- On the balance graphs, we observe that the standardized difference between J-CHiP post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes is slightly higher than the desired difference of 10 percent, which we adjust for in our regression models.

Exhibit D.J-CHiP.3: Common Support and Covariate Balance for Dually Eligible J-CHiP and Comparison Beneficiary-Episodes, Medicaid Analysis

Common Support and Balance: Post-treatment vs. Post-comparison



Balance: Post-treatment vs. Pre-treatment



Balance: Post-treatment vs. Pre-comparison

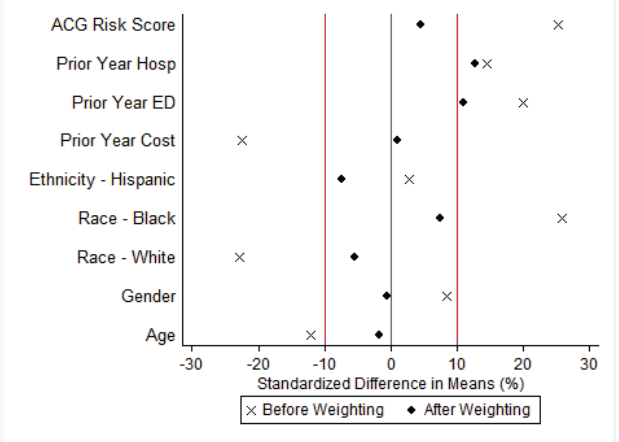
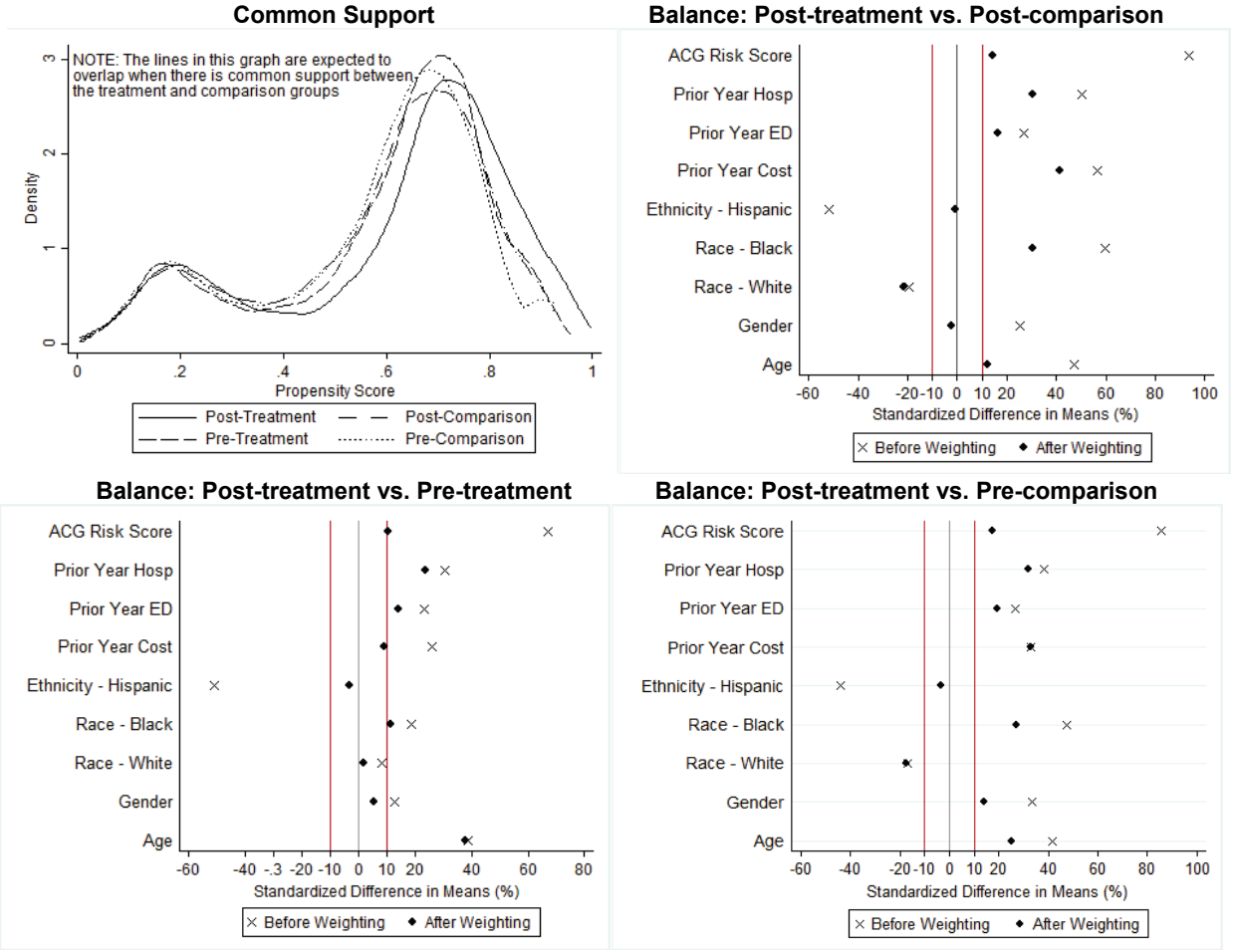


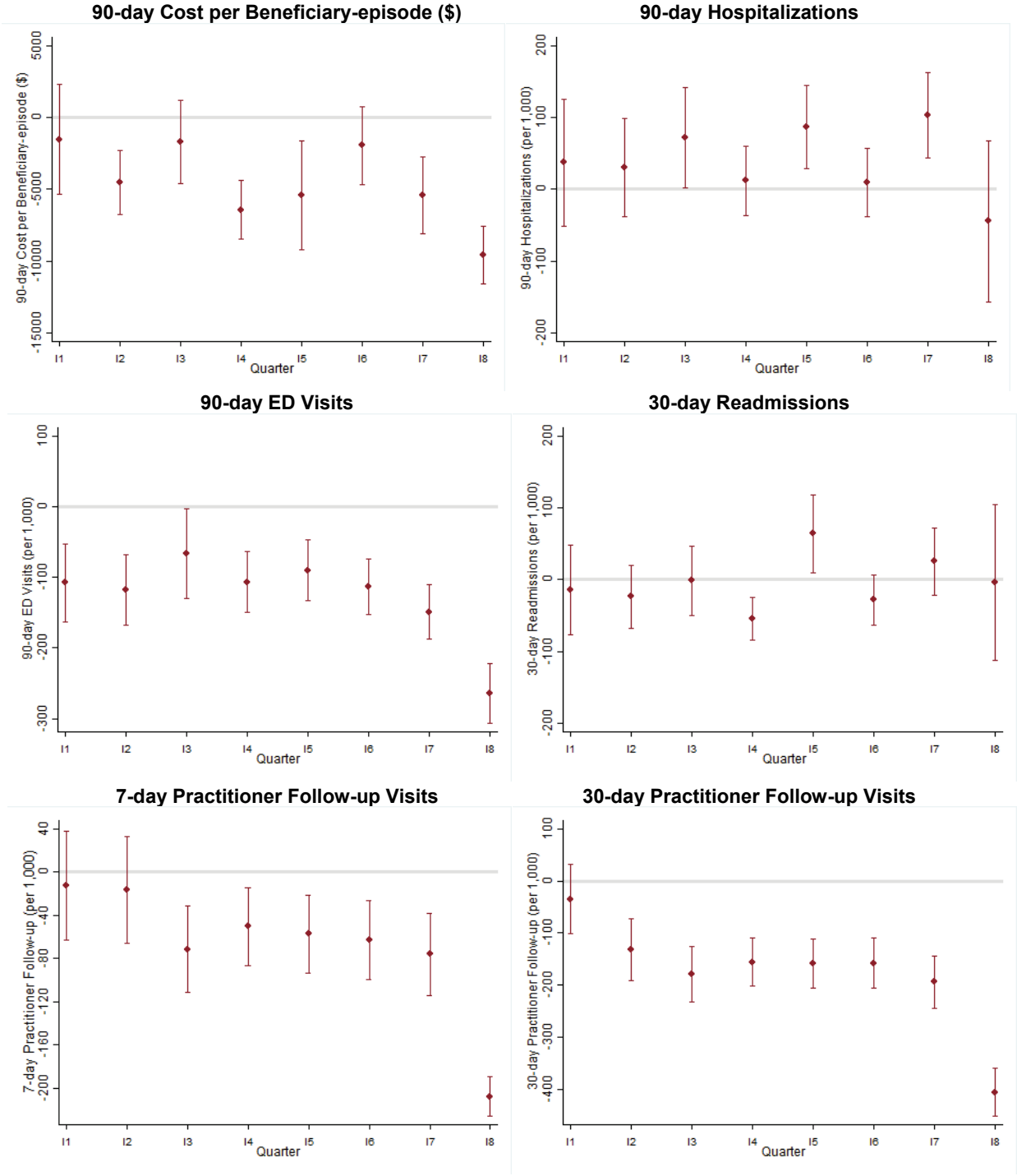
Exhibit D.J-CHiP.4: Common Support and Covariate Balance for Medicaid Only J-CHiP and Comparison Beneficiary-Episodes, Medicaid Analysis



Impact of J-CHiP Hospital Arm in Each Quarter of Enrollment, Medicaid Analysis. Findings from pooled quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.J-CHiP.5 displays the results of the quarterly fixed effects DID models.[379]

[379] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episode (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.J-CHiP.5: Impact of the J-CHiP Hospital Arm on Outcomes by Quarter, Medicaid Analysis

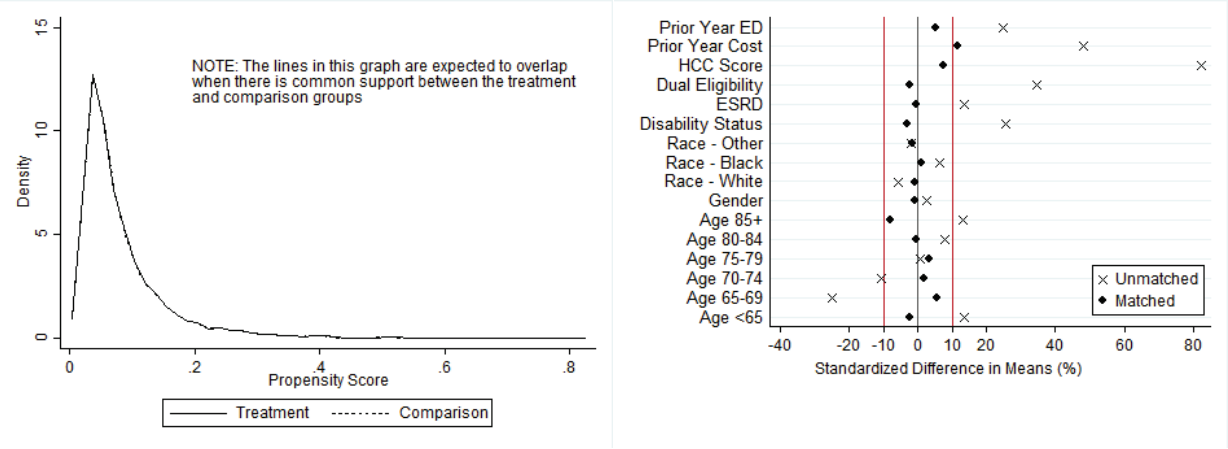


Community Arm, Medicare Analysis

Exhibit D.J-CHiP.6 presents common support and covariate balance across J-CHiP Medicare treatment and comparison group beneficiaries in the community arm.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between J-CHiP participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization (right graph).

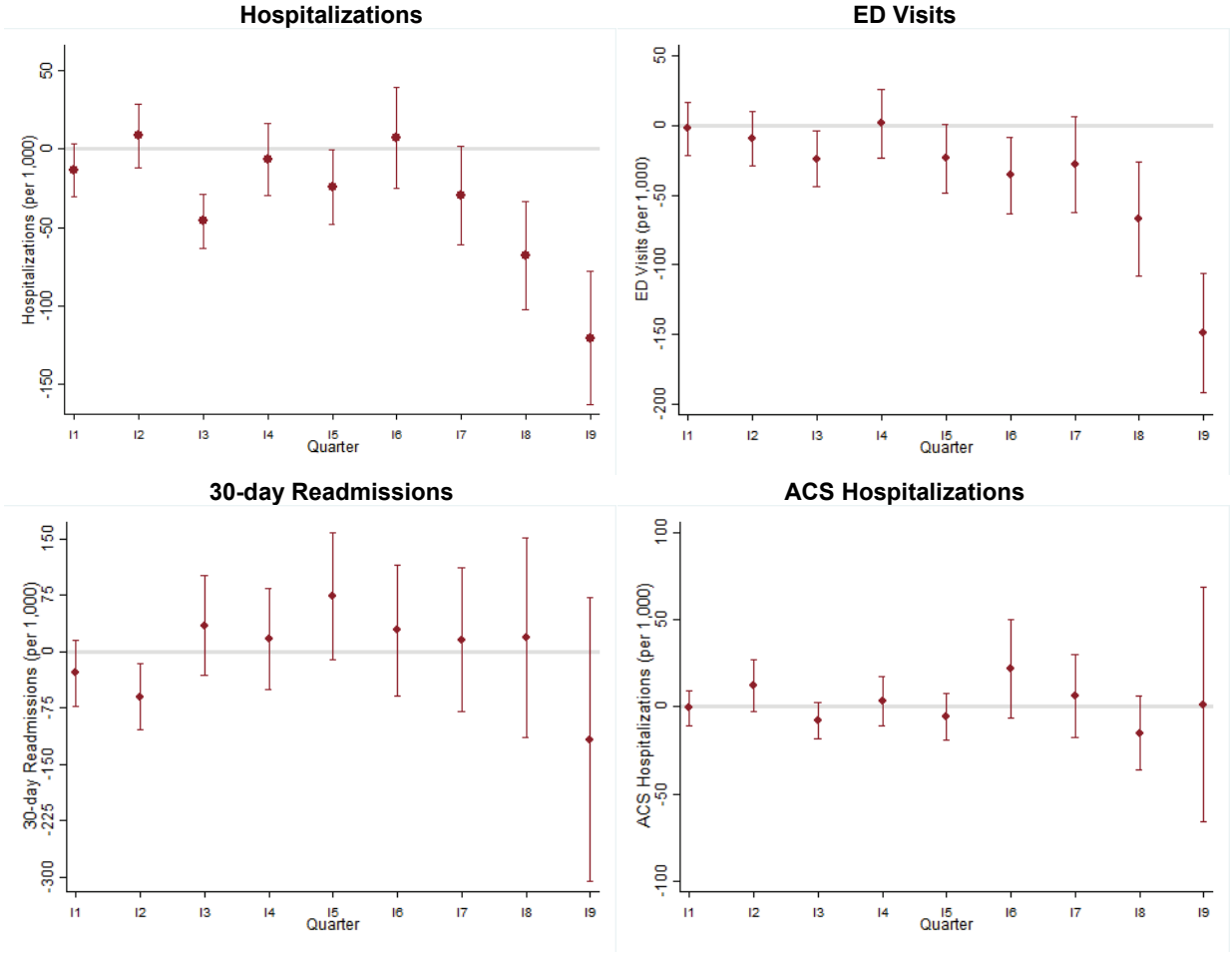
Exhibit D.J-CHiP.6: Common Support and Covariate Balance for J-CHiP and Comparison Participants, Medicare Analysis



Impact of J-CHiP Community Arm in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter for hospitalizations, ED visits, readmissions, and ACS hospitalizations are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.J-CHiP.7 displays the results of the quarterly fixed effects DID models.[380] Findings from the QFE model for total cost of care departed from the matched quarterly and aggregate results and thus we present and discuss them in the awardee chapter.

[380] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.J-CHiP.7: Impact of the J-CHiP Community Arm on Outcomes by Quarter, Medicare Analysis



Community Arm, Medicaid Analysis

Exhibits D.J-CHiP.8 and D.J-CHiP.9 present common support and covariate balance across treatment and comparison groups for dually eligible and non-dually eligible Medicaid beneficiaries in the community arm.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between J-CHiP participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization (right graph).

Exhibit D.J-CHiP.8: Common Support and Covariate Balance for Dually Eligible and Comparison Participants, Medicaid Analysis

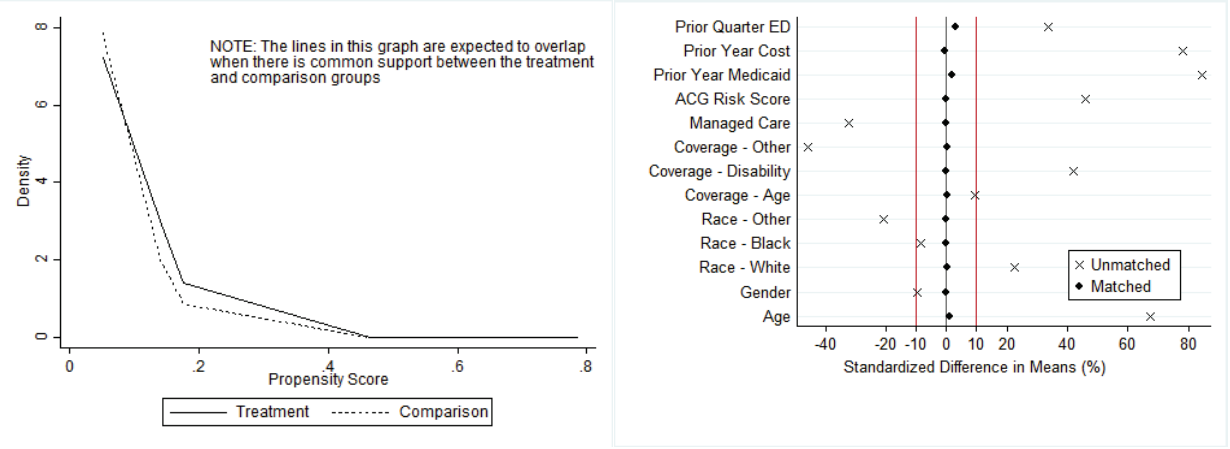
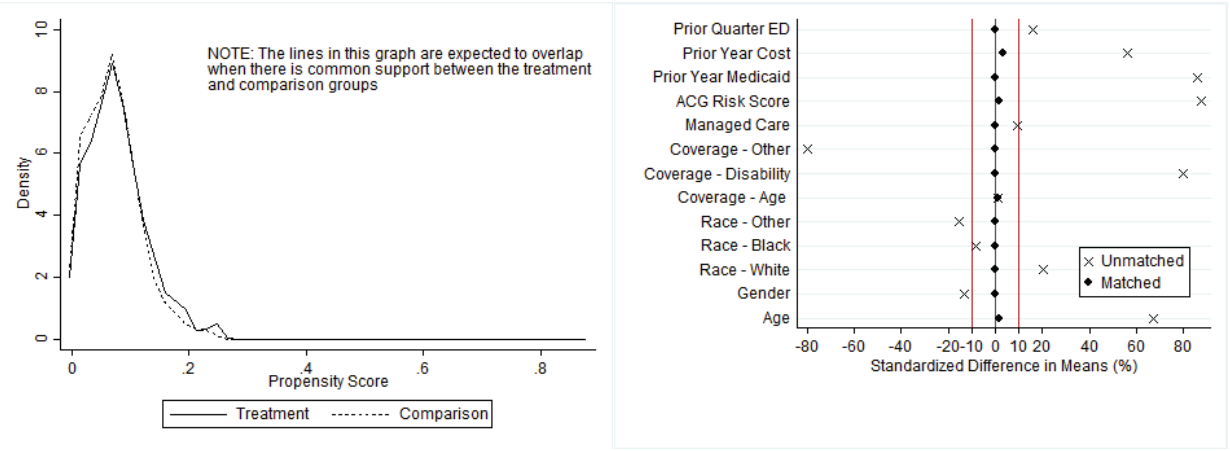


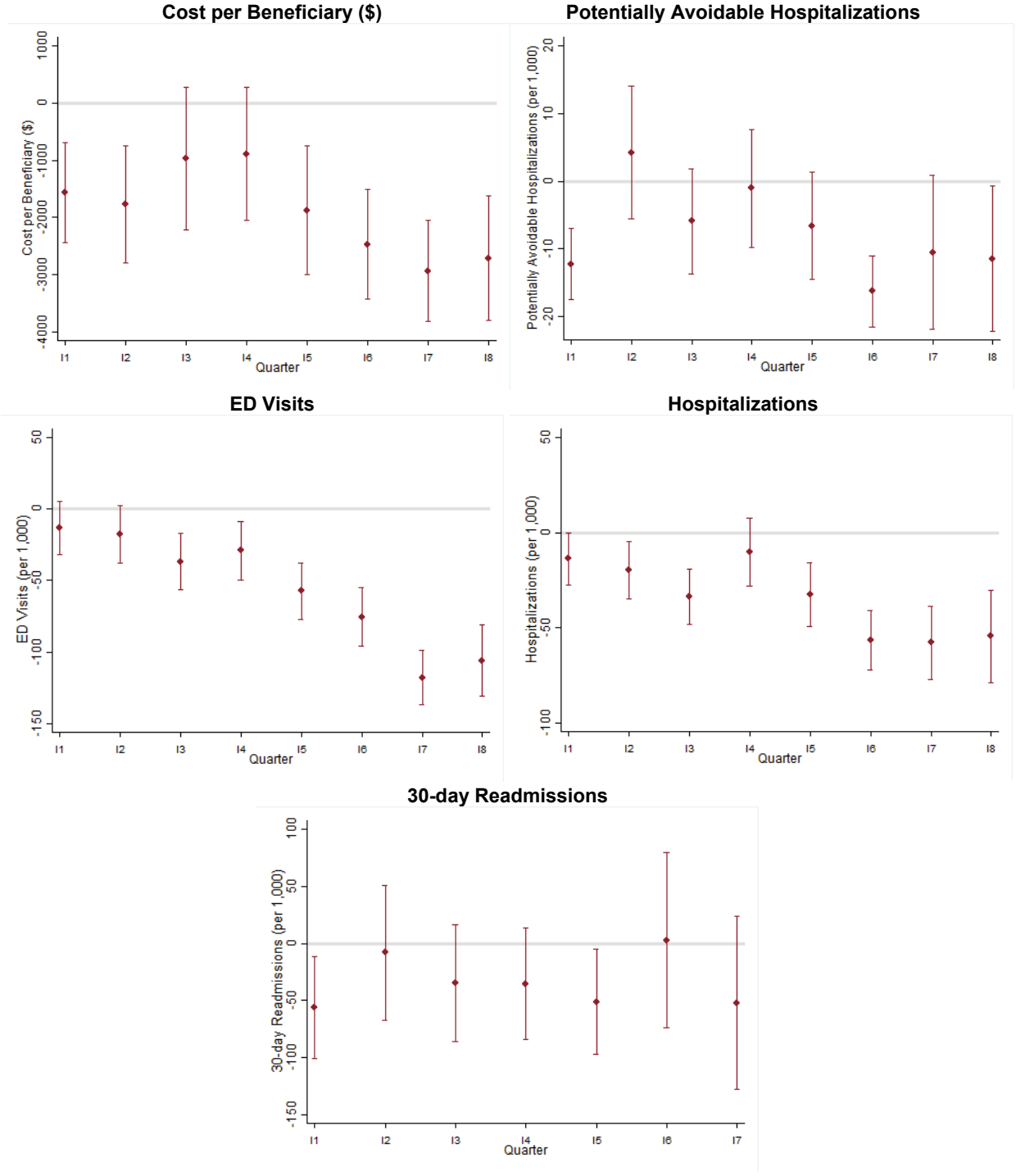
Exhibit D.J-CHiP.9: Common Support and Covariate Balance for Medicaid Only and Comparison Participants, Medicaid Analysis



Impact of J-CHiP Community Arm in Each Quarter of Enrollment, Medicaid Analysis. Findings from pooled quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.J-CHiP.10 displays the results of the quarterly fixed effects DID models.[381]

[381] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.J-CHiP.10: Impact of the J-CHiP Community Arm on Outcomes by Quarter, Medicaid Analysis



J-CHiP Subgroup Analyses

Impact of J-CHiP, Hospital Arm, Medicare, Discharges to Partner Skilled Nursing Facilities (SNF). Exhibit D.J-CHiP.11 presents an adjusted model of the impact of the awardee's program, looking at

beneficiary-episodes for those discharged to SNF. We find the following, relative to the comparison group:[382]

- **Cost:** a non-significant increase in 90-day total quarterly cost of care.
- **Utilization Measures:** a significant increase in 90-day hospitalizations per quarter (96 per 1,000 beneficiary-episodes), with non-significant increases in 90-day ED visits and 30-day readmissions per quarter.
- **Quality of Care:** No significant impact on 30-day practitioner follow-up per quarter.[383]

Exhibit D.J-CHiP.11: Subgroup Analysis: Impact of the J-CHiP Intervention's Hospital Arm, for Medicare Beneficiaries Discharged to Partner Skilled Nursing Facilities

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (per 1,000 Beneficiary-episodes unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**
90-day Total Cost of Care per Beneficiary-episode ($)	$355 [-$4,983,$ 5,693]
90-day Hospitalizations	**96 [29, 163]****
90-day ED Visits	19 [-38, 76]
30-day Readmissions	55 [-3, 113]
30-day Practitioner Follow-up Visits	-33 [-75, 9]
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$1,179,860 [-$16,581,314, $18,941,034]
Hospitalizations	**318 [96, 540]****
ED Visits	63 [-128, 254]
Readmissions	184 [-10, 378]
30-day Practitioner Follow-up Visits	-111 [-252, 30]

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates finding that reaches statistical significance.
§: Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program implementation.
§§: Aggregate Impact is the total difference-in-differences estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based the total number of program participants (beneficiary-episodes in analysis (3,539) and length of program implementation in analysis: 8 quarters.

Impact of J-CHiP, Hospital Arm, Medicaid, Discharges to Partner Skilled Nursing Facilities (SNF). As with the main analysis above, Exhibit D.J-CHiP.12 presents an adjusted model of the average quarterly and aggregate impact of the program on its participants relative to the comparison group. Utilization measures are reported as binary indicators, noting whether an event occurred in each quarter for a specific beneficiary-episode, looking at beneficiary-episodes for those discharged to SNF.[384] We find the following, relative to the comparison group:

- **Cost:** a non-significant increase in 90-day total cost of care.

[382] Adjustment factors include age category, race/ethnicity, gender, prior year hospitalization and cost, dual eligibility indicator, discharge disposition, HCC score, ESRD indicator, and disability indicator. Readmissions and cost models exclude prior year hospitalization or cost; Hospitalization and ED visit models exclude prior year hospitalization.

[383] Since beneficiaries are discharged to SNF, we do not measure impact on 7-day practitioner follow-up.

[384] Adjustment factors include age category, race/ethnicity, gender, prior year utilization, prior year coverage under Medicaid, discharge disposition, ACG score, reason for coverage. Pooled analysis also adjust for dual eligibility. Readmissions and cost models exclude prior year hospitalization or cost; Hospitalization and ED visit models exclude prior year hospitalization.

- **Utilization Measures:** increases in 90-day hospitalizations per quarter (201 per 1,000 beneficiary-episodes) and 30-day readmissions per quarter (119 per 1,000 beneficiary-episodes), and non-significant decreases in 90-day ED visits per quarter.
- **Quality of Care Measures:** decreases in 30-day practitioner follow-up visits per quarter (-353 per 1,000 beneficiary-episodes). [385]

Exhibit D.J-CHiP.12: Subgroup Analysis: Impact of the J-CHiP Intervention's Hospital Arm, for Medicaid Beneficiaries Discharged to Partner Skilled Nursing Facilities

AVERAGE QUARTERLY IMPACT§	
Outcome Measure (Number per 1,000 Beneficiary-episodes unless otherwise noted)	**Adjusted Estimate [90% Confidence Interval]**
90-day Total Cost of Care per Beneficiary-episode ($)	$1,313 [-$4,372,$ 6,998]
90-day Hospitalizations	**201 [96, 306]*** **
90-day ED Visits	-11 [-90,68]
30-day Readmissions	**119 [48, 190]*** **
30-day Practitioner Visit follow-up	**-353 [-448, -258]*** **
AGGREGATE IMPACT§§	
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**
Total Cost of Care ($)	$1,155,544 [-$3,846,914, $6,158,002]
Hospitalizations	**176 [83, 269]*** **
ED Visits	-10 [-79,59]
Readmissions	**105 [42, 168]*** **
30-day Practitioner Visit follow-ups	**-310 [-394, -226]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01. **Bold font** indicates finding that reaches statistical significance.
§: Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program implementation. §§: Aggregate Impact is the total difference-in-differences estimate for all program participants across all quarters of program implementation. Aggregate Impact is estimated for this awardee based on the total number of beneficiary episodes (941) and total length of program implementation in analysis (8 quarters).

Impact of J-CHiP, Community arm, Medicare, by Program and Dose. Exhibits D.J-CHiP.13 and D.J-CHiP.14 present results of impacts enrollees receiving assistance from three types of program staff: 1) Neighborhood Navigators (NN) who canvas East Baltimore neighborhoods engaging beneficiaries in managing their health and directing them to primary care; 2) community health workers and case managers employed by Johns Hopkins (JH) and who work in primary care clinics and the community to help enrollees manage their health and 3) community health workers and a case manager (CM) employed through a partner organization, Sisters Together and Reaching (STAR), who engage enrollees in a variety of settings (clinics and homes) to help enrollees manage their health. For the dose analysis, we compare

[385] Since beneficiaries are discharged to SNF, we do not measure impact on 7-day practitioner follow-up.

program impacts for participants who had and did not have continuous (quarterly) contact with program staff.[386] We find the following, relative to the comparison group:

- **Cost:** no significant decreases in total cost of care per beneficiary in the post period relative to the comparison group for any of the programs. We also find non-significant declines in total cost of care each quarter for those with continuous contact and those without continuous contact.
- **Utilization Measures:** significant decreases in both hospitalizations and ED visits for those managed by JH CHWs/CMs or J-CHiP STAR CHWs/CM. Wider confidence intervals for the NN program, and to a lesser extent, those managed by STAR CHWs reflect smaller sample sizes, which may explain the lack of observed differences. For the dose analysis, significantly fewer hospitalizations for those in intermittent contact and significant decreases in ED visits for those with continuous contact and those in intermittent contact (-26 and -13 per 1,000 beneficiaries, respectively). No significant decrease in readmissions in either dose group.
- **Quality of Care:** no significant declines in ambulatory care-sensitive hospitalizations in either dose group.

Exhibit D.J-CHiP.13: Subgroup Analysis: Quarterly Impact of the J-CHiP Intervention's Community Arm, Medicare Beneficiaries, by Program

Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate, by Program [90% Confidence Interval]**		
	Neighborhood Navigator (N=25)	**JH CHWs/CMs (N=1,771)**	**STAR CHWs/CM (N=229)**
Total Cost of Care per Beneficiary ($)	$1,669 [-$2,016, $5,354]	$18 [-$589 , $621]	-$573 [-$2,038, $892]
Hospitalizations	43 [-52, 138]	**-15 [-27, -3]****	**-37 [-67, -7]****
ED Visits	-54 [-167, 59]	**-13 [-25, -1]***	**-32 [-64, 0]***

NOTE: *p<0.10, **p<0.05, ***p<0.01. The summative model is estimated for this awardee based on the number of program participants (N shown above) and length of program implementation in analysis (9 quarters).

[386] Due to small sample size in each quarter, we estimated average quarterly impacts using a *summative* DID model that examines the impact of the awardee across the entire post-intervention period. For the summative DID model, we compare the *average* outcomes of participants in the J-CHiP program with those of the comparison groups across the entire post-intervention period, after adjusting for differences in secular trends and risk factors across both groups. Adjustment factors are: post-intervention indicator, age category, gender, race/ethnicity, dual eligibility indicator, HCC Risk score, discharge category, a disability indicator, and an ESRD indicator. Note that some beneficiaries may not have received contact from a case manager if services were not needed and/or the case was closed. Results from these analyses should be interepreted with caution, given the small sample sizes.

Exhibit D.J-CHiP.14: Subgroup Analysis: Quarterly Impact of the J-CHiP Intervention's Community Arm, Medicare Beneficiaries, by Dose

Outcome Measure (per 1,000 beneficiaries unless noted)	Adjusted Estimate, by Contact (Dose) [90% Confidence Interval]	
	Continuous (N=1,039)	Intermittent (N=2,084)
Total Cost of Care per Beneficiary ($)	-$437 [-$1,202, $328]	-$420 [-$967, $127]
Hospitalizations	-10 [-25, 5]	**-18 [-29, -7]*** **
ED Visits	**-26 [-42, -10]*** **	**-13 [-24, -2]***
30-Day Readmissions	29 [-13, 71]	-7 [-36, 22]
Ambulatory Care-sensitive Hospitalizations	7 [-2, 16]	2 [-4, 8]

NOTE: *p<0.10, **p<0.05, ***p<0.01. The summative model is estimated for this awardee based on the number of program participants (N shown above) and length of program implementation in analysis (9 quarters).

Impact of J-CHiP, Community Arm, Medicaid, by Program and Dose. Exhibits D.J-CHiP.15 and D.J-CHiP.16 presents results of impacts for the J-CHiP community program for its Medicaid beneficiaries (those managed by JH CHWs/CMs or STAR CHWs/CM) relative to a matched comparison group and by dose (e.g., whether an enrollee is in continuous or intermittent contact with intervention staff), relative to a matched comparison group. [387,388,389] The model based indicate the following for Medicaid beneficiaries in J-CHiP's community arm, relative to the comparison group:

- **Cost:** a statistically significant decrease in total cost of care per beneficiary, relative to the comparison group, in the post period for both those managed by JH CHWs/CMs (-$1,715) or STAR CHWs/CM (-$2138); and a statistically significant decrease in total cost of care per beneficiary for both the continuously contacted (-$2,062) and those not continuously contacted (-$1,715), with no statistically significant difference between the two groups.
- **Utilization Measures:** significant decreases in hospitalizations and ED visits for both beneficiaries managed by JH CHWs/CMs or STAR CHWs/CM; and a significant decrease in readmissions for those managed by JH CHWs. Turning to dose effects, we found that both those who had contact each quarter (by phone, email, or in-person) after enrollment with program staff, and participants who did not have continuous contact experienced few hospitalizations, ED visits, and PAH in the post-implementation period. Those who did not have continuous contacted also experienced significantly fewer readmissions, relative to the comparison group. The fewer readmissions among those without contact each quarter could be due to a higher health or functional status in this group, relative to those with continuous contact.
- **Quality of Care:** a significant decrease in potentially avoidable hospitalizations for participants managed by JH CHWs/CMs.

387 Due to small sample size in each quarter, we estimated average quarterly impacts using a *summative* DID model that examine the impact of the awardee across the entire post-intervention period. For the summative DID model, we compare the *average* outcomes of participants in the J-CHiP program with those of the comparison groups across the entire post-intervention period, after adjusting for differences in secular trends and risk factors across both groups

388 Adjustment factors include post-intervention indicator, age category, gender, race/ethnicity, indicators for reason for Medicaid coverage, indicator for managed care participation, and ACG Risk score. Pooled models also include a dual eligibility indicator.

389 Note that we were unable to match enough individuals who received the Neighborhood Navigator program with Medicaid claims data to conduct an analysis on this program component using Medicaid claims.

Although the effect size of the estimated outcomes are different between the continuously contacted and those not continuously contacted, we observe no statistical difference, likely due to the large confidence intervals of each estimate. We were not able to include Medicaid beneficiaries who were in the Neighborhood Navigator participants program.

Exhibit D.J-CHiP.15: Subgroup Analysis: Impact of the J-CHiP Community Arm, Medicaid Beneficiaries, by Program

Outcome Measure (per 1,000 beneficiaries unless noted)	Adjusted Estimate, by Program [90% Confidence Interval]	
	JH CHWs/CMs (N=2,255)	STAR CHWs/CMs (N=309)
90-Day Total Cost of Care per Beneficiary ($)	**-$1,715 [-$2,803, -$627]*** **	**-$2,138 [-$3,919, -$357]** **
90-Day Hospitalizations	**-25 [-34, -16]*** **	**-26 [-50, -2]** **
90-Day ED Visits	**-40 [-52, -28]**** **	**-60 [-90, -30]*** **
30-Day Readmissions	**-38 [-72, -4]** **	47 [-116, 210]
Potentially Avoidable Hospitalizations	**-8 [-13, -3]*** **	-0 [-14, 14]

NOTE: *p<0.10, **p<0.05, ***p<0.01. The summative model is estimated for this awardee based on the number of program participants (N shown above) and length of program implementation in analysis (9 quarters).

Exhibit D.J-CHiP.16: Subgroup Analysis: Impact of the J-CHiP Community Arm, Medicaid Beneficiaries, by Dose

Outcome Measure (per 1,000 beneficiaries unless noted)	Adjusted Estimate, by Dose [90% Confidence Interval]	
	Continuously Contact (N=1,666)	Intermittent Contact (N=2,511)
90-Day Total Cost of Care per Beneficiary ($)	**-$2,062 [-$3,364, -$760]*** **	**-$1,715 [-$2,684, -$746]*** **
90-Day Hospitalizations (Likelihood per 1,000 Beneficiary)	**-29 [-40, -18]*** **	**-27 [-36, -18]*** **
90-Day ED Visits (Likelihood per 1,000 Beneficiary)	**-50 [-64, -36]*** **	**-43 [-54, -32]*** **
30-Day Readmissions (Likelihood per 1,000 Beneficiary)	-25 [-64, 14]	**-37 [-69, -5]** **
PAH Visits (Likelihood per 1,000 Beneficiary)	**-6 [-11, -1]** **	**-8 [-12, -4]*** **

NOTE: *p<0.10, **p<0.05, ***p<0.01. The summative model is estimated for this awardee based on the number of program participants (N shown above) and length of program implementation in analysis (9 quarters).

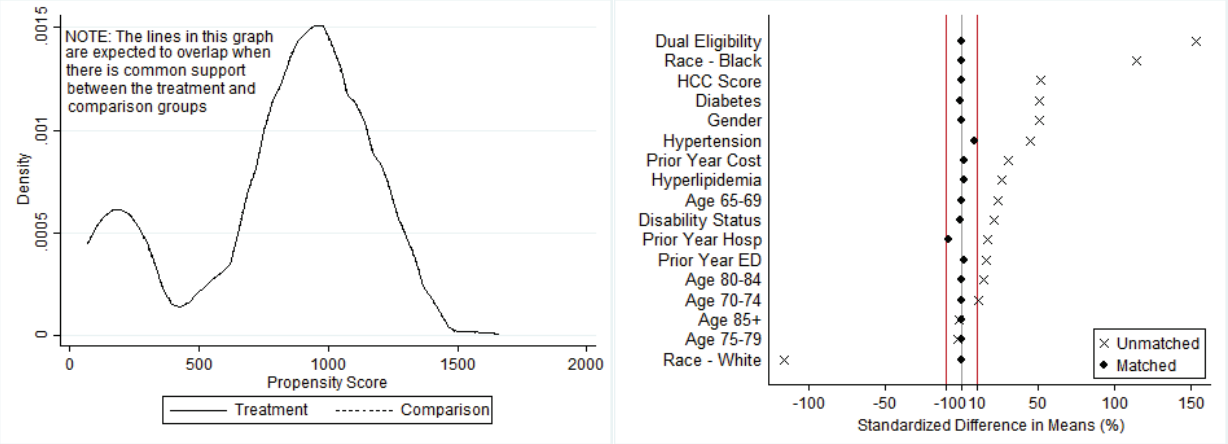
Johns Hopkins University School of Nursing

Medicare Analysis

Exhibit D.JHUSON.1 presents common support and covariate balance across Project CAPABLE Medicare treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between Project CAPABLE participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

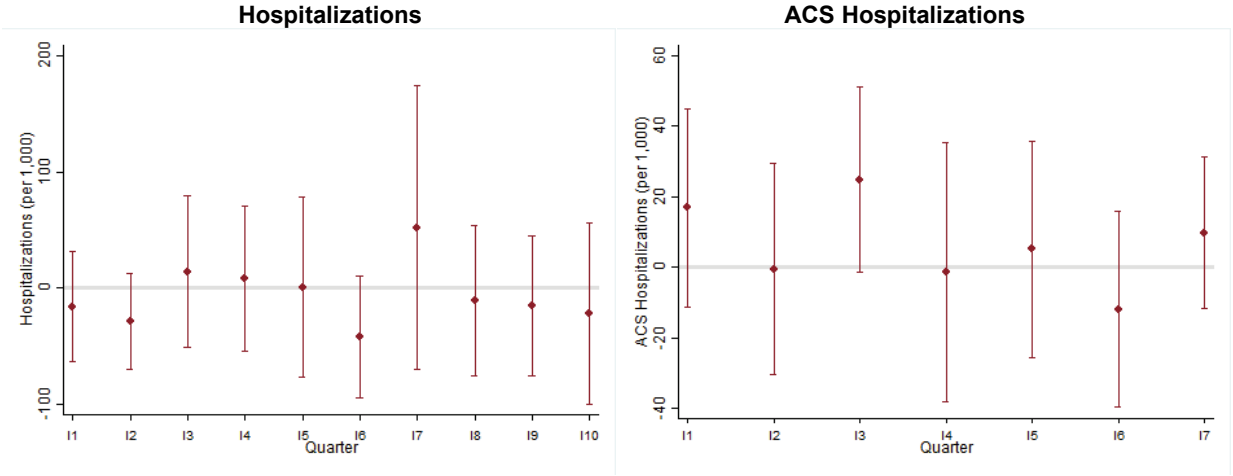
Exhibit D.JHUSON.1: Common Support and Covariate Balance for Project CAPABLE and Comparison Participants, Medicare Analysis



Impact of Project CAPABLE Program in Each Quarter of Enrollment, Medicare Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter for hospitalizations and ACS hospitalizations are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.JHUSON.2 displays the results of the quarterly fixed effects DID models.[390] Findings from the QFE models for total cost of care, 30-day readmissions, and ED visits departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

[390] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I10) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.JHUSON.2: Impact of the Project CAPABLE Program on Outcomes by Quarter, Medicare Analysis

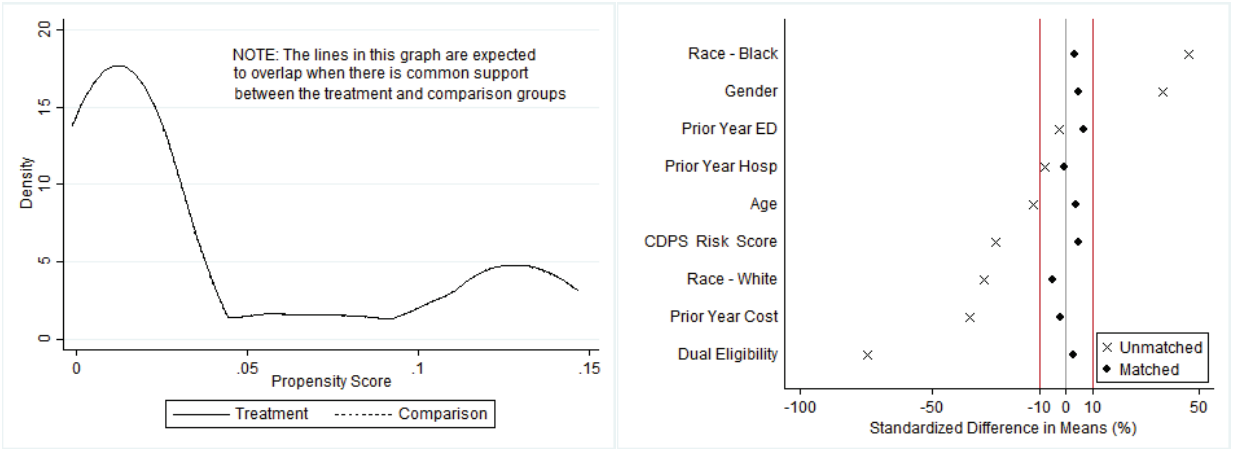


Medicaid Analysis

Exhibit D.JHUSON.3 presents common support and covariate balance across Project CAPABLE Medicaid treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between Project CAPABLE participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.JHUSON.3: Common Support and Covariate Balance for Project CAPABLE and Comparison Participants, Medicaid Analysis



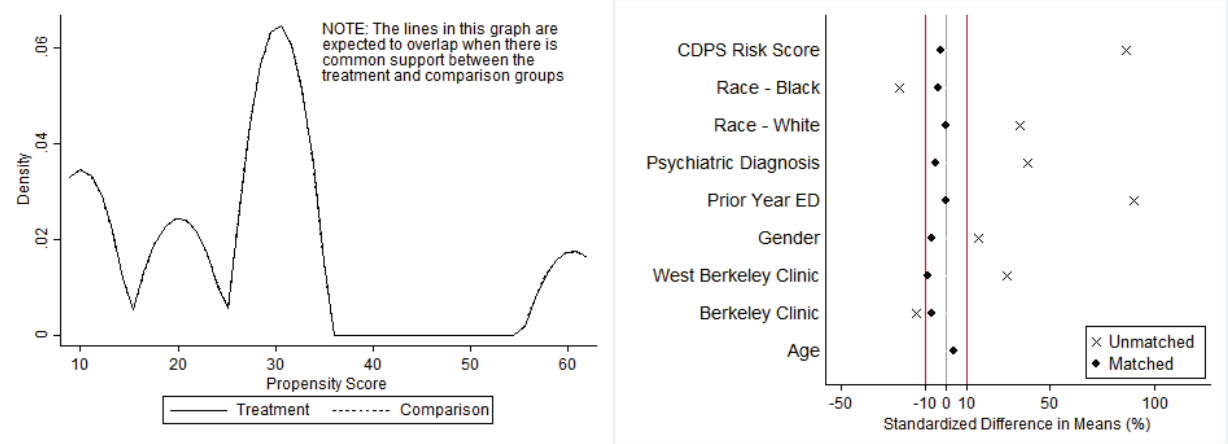
Impact of Project CAPABLE Program in Each Quarter of Enrollment, Medicaid Analysis. Findings from the QFE models for total cost of care, hospitalizations, and ED visits departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

LifeLong Medical Care

Exhibit D.LCCI.1 presents common support and covariate balance across LCCI treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between LCCI participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization (right graph).

Exhibit D.LCCI.1: Common Support and Covariate Balance for LCCI and Comparison Participants

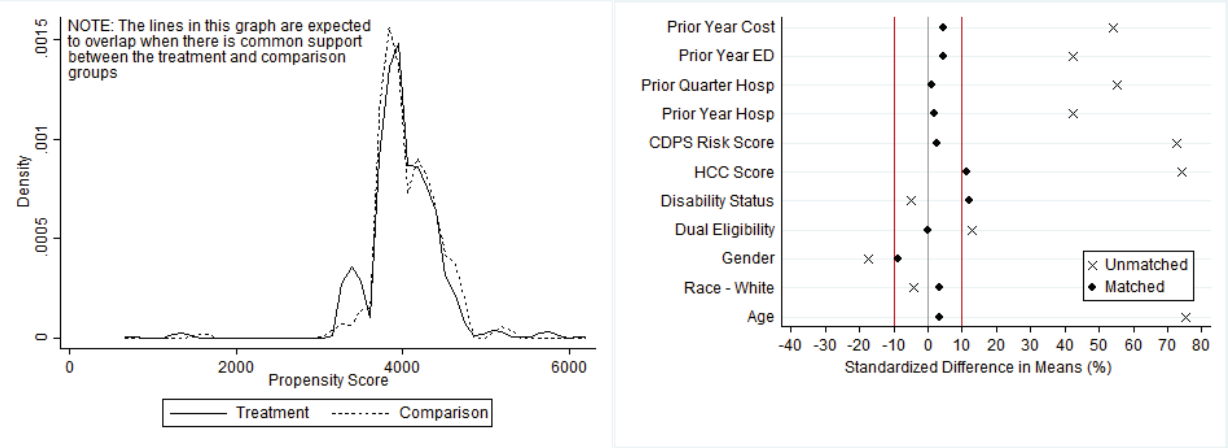


Northland Healthcare Alliance

Exhibit D.NCCS.1 presents common support and covariate balance across NCCS treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between NCCS participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph). Although we were not able to achieve balance on the HCC status or dual eligibility indicators, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

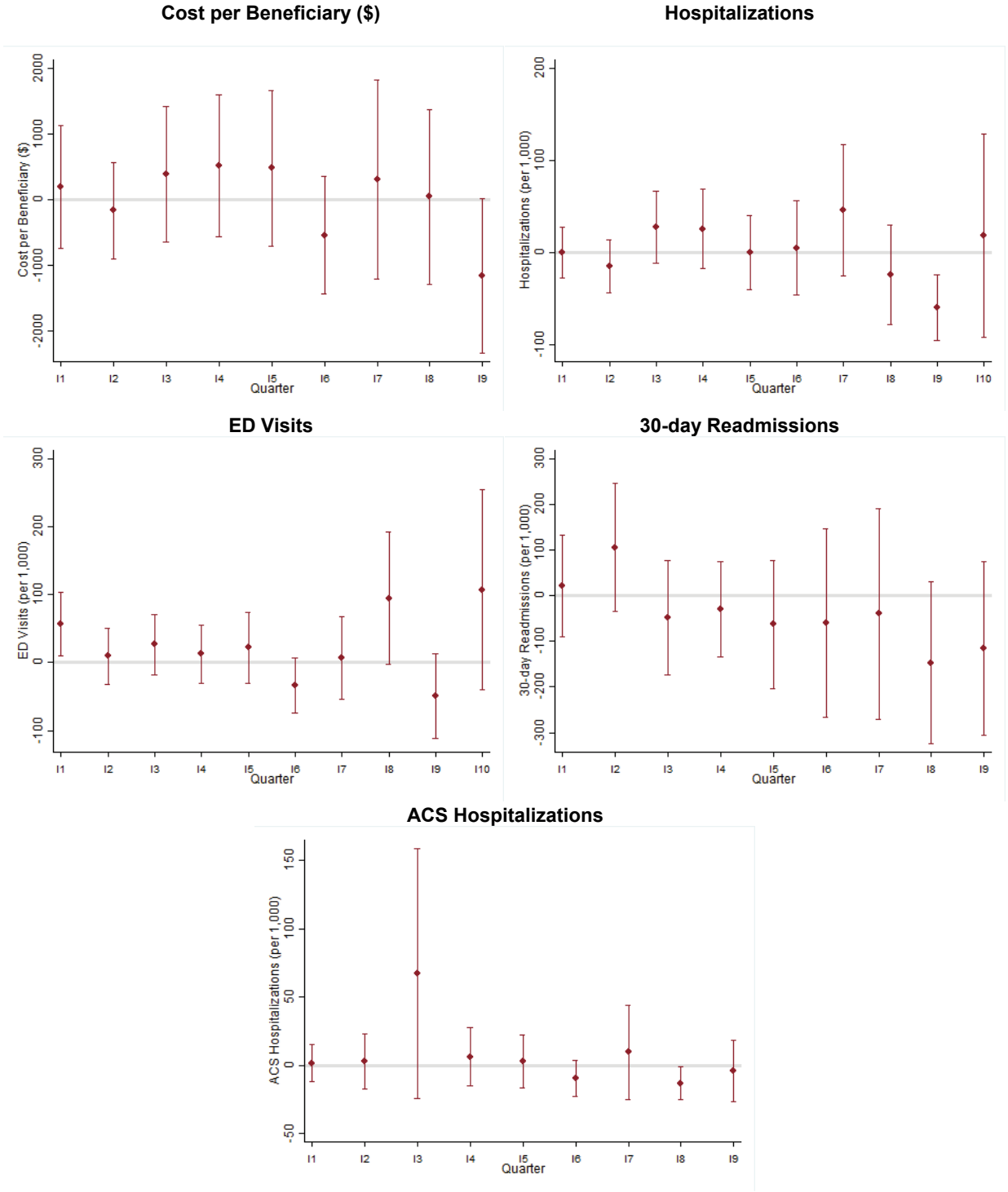
Exhibit D.NCCS.1: Common Support and Covariate Balance for NCCS and Comparison Participants



Impact of NCCS Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.NCCS.2 displays the results of the quarterly fixed effects DID models.[391]

[391] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.NCCS.2: Impact of the NCCS Program on Outcomes by Quarter[392]



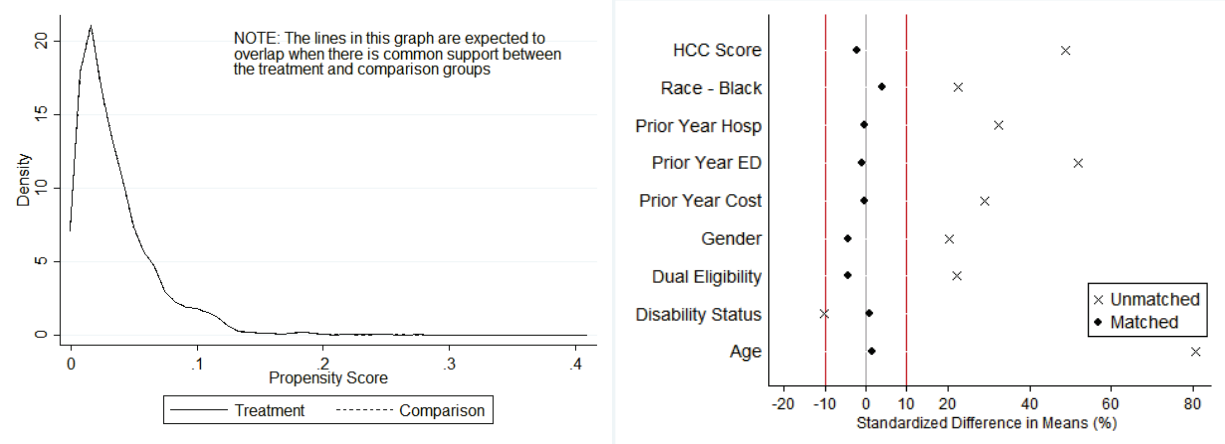
[392] In post-intervention quarter 3 (I3) of the ACS hospitalization analysis, the comparison group had 2/428 ACS admissions and the treatment group had 14/418.

Palliative Care Consultants of Santa Barbara

Exhibit D.PCCSB.1 presents common support and covariate balance across DASH treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between DASH participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

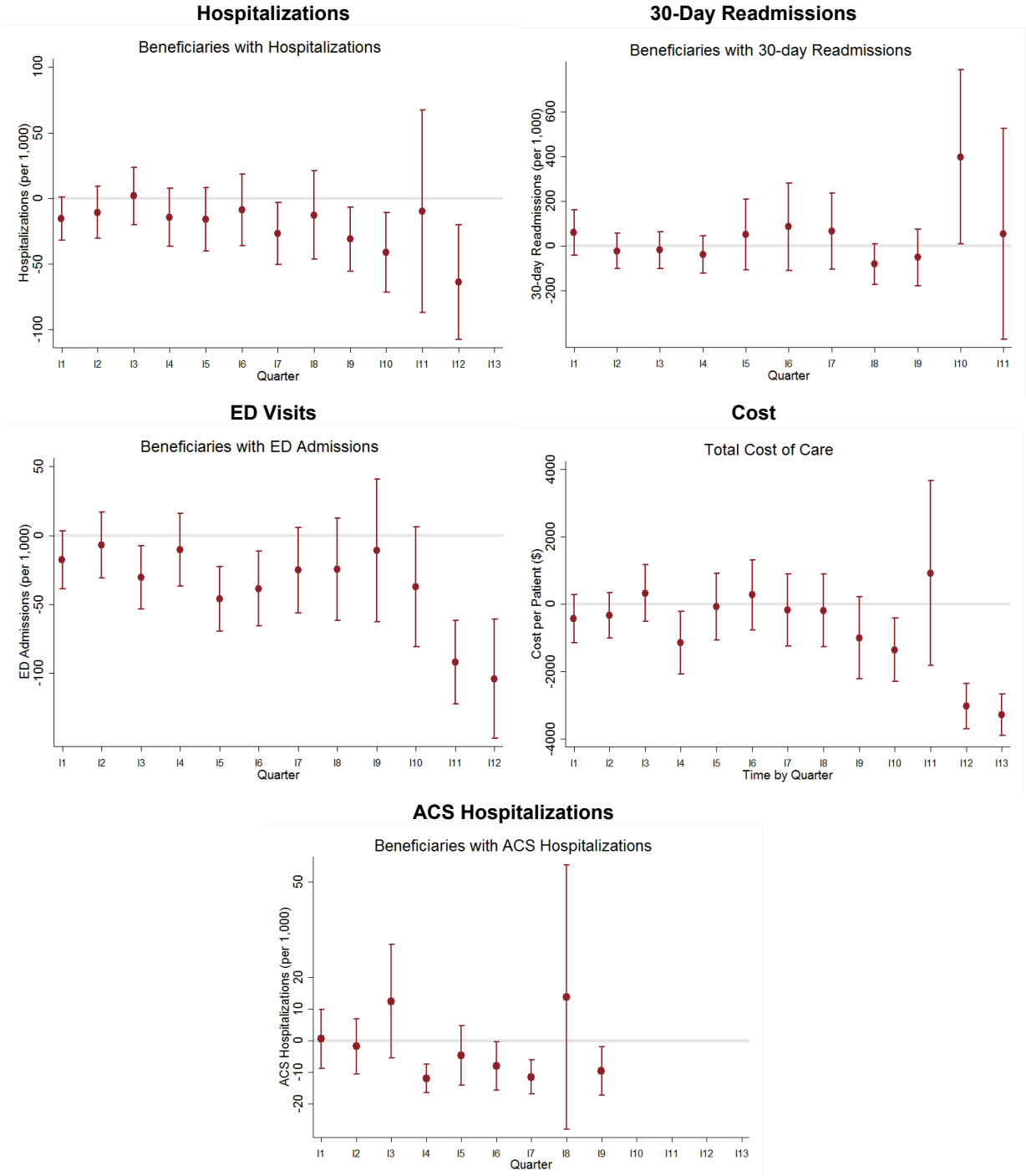
Exhibit D.PCCSB.1: Common Support and Covariate Balance for DASH and Comparison Participants



Impact of DASH Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PCCSB.2 displays the results of the quarterly fixed effects DID models.[393] Due to the relatively low frequency of some events, we have omitted some of the post-implementation quarters from the analyses of utilization measures—we show nine quarters of data for hospitalizations and eight for ED admissions, and omit the quarterly fixed effects DID models for 30-day readmissions and ambulatory care-sensitive hospitalizations completely.

[393] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I11) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.PCCSB.2: Impact of the DASH Program on Outcomes by Quarter

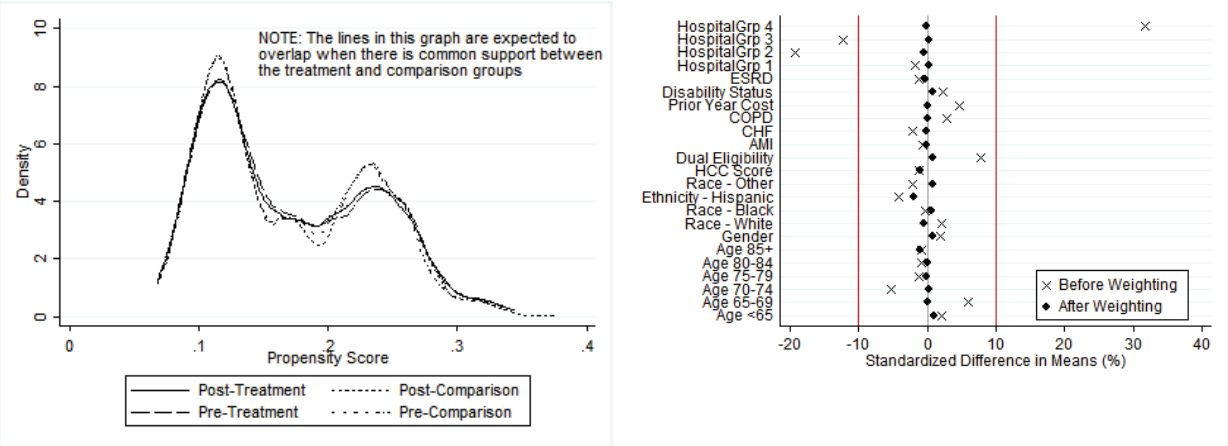


Pittsburgh Regional Health Initiative

Exhibit D.PRHI.1 presents common support and covariate balance across PCRC post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes after relative weighting. 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 (AMI, COPD, or CHF), then 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.

- After relative weighting, we observe a high level of overlap in the distribution of estimated propensity scores across PCRC post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes (left graph).
- On the balance graph (right graph), we are able to show that the standardized difference between PCRC post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes across all covariates is negligible after incorporating relative weights.

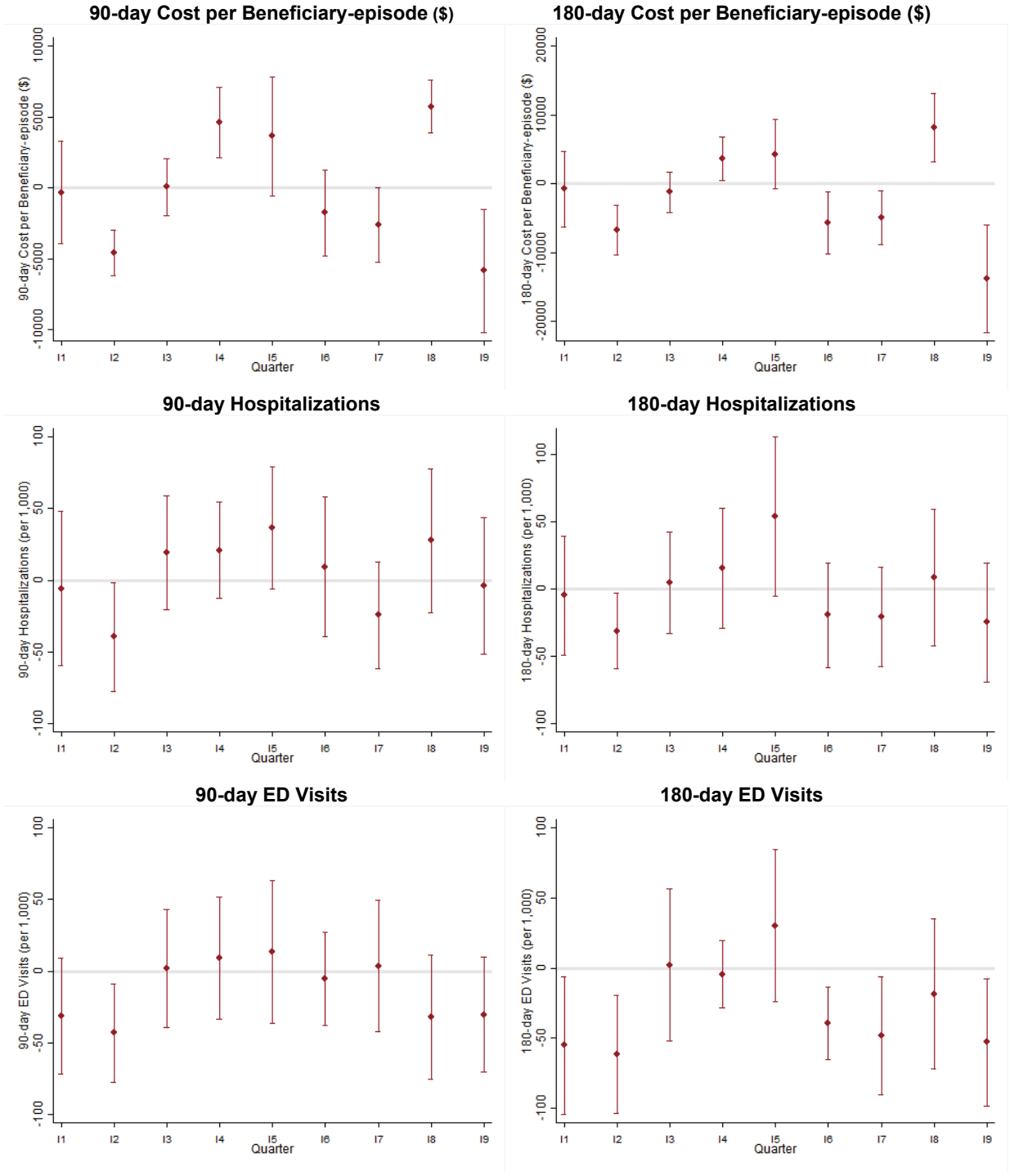
Exhibit D.PRHI.1: Common Support and Covariate Balance for PCRC and Comparison Beneficiary-Episodes



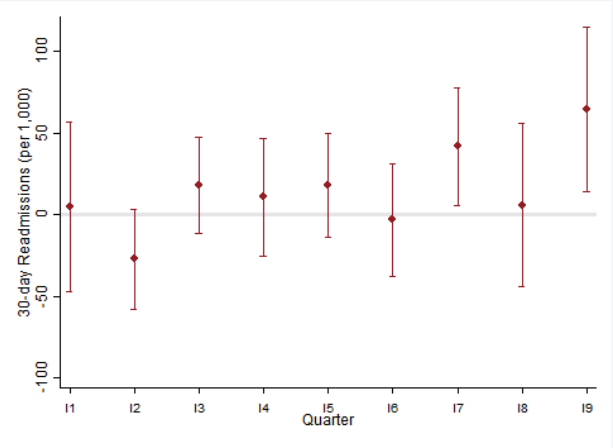
Impact of PCRC Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PRHI.2 displays the results of the quarterly fixed effects DID models. [394]

[394] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I9) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

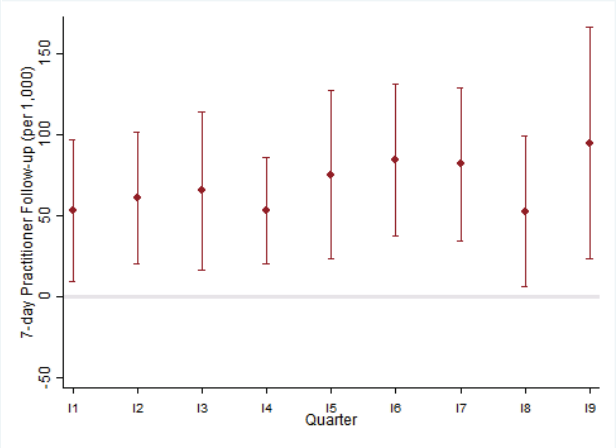
Exhibit D.PRHI.2: Impact of the PCRC Program on Outcomes by Quarter



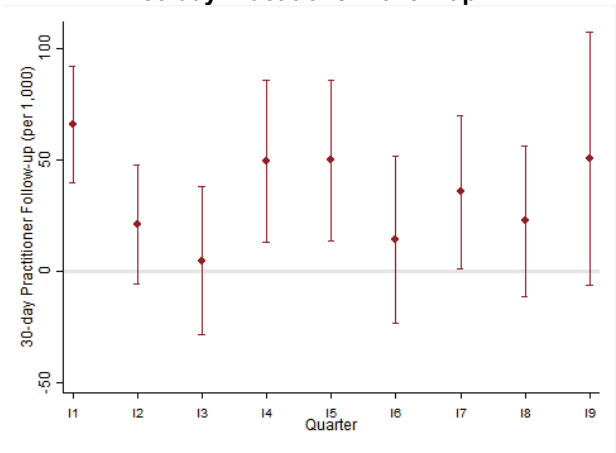
30-day Readmissions



7-day Pracitioner Follow-up



30-day Practitioner Follow-up



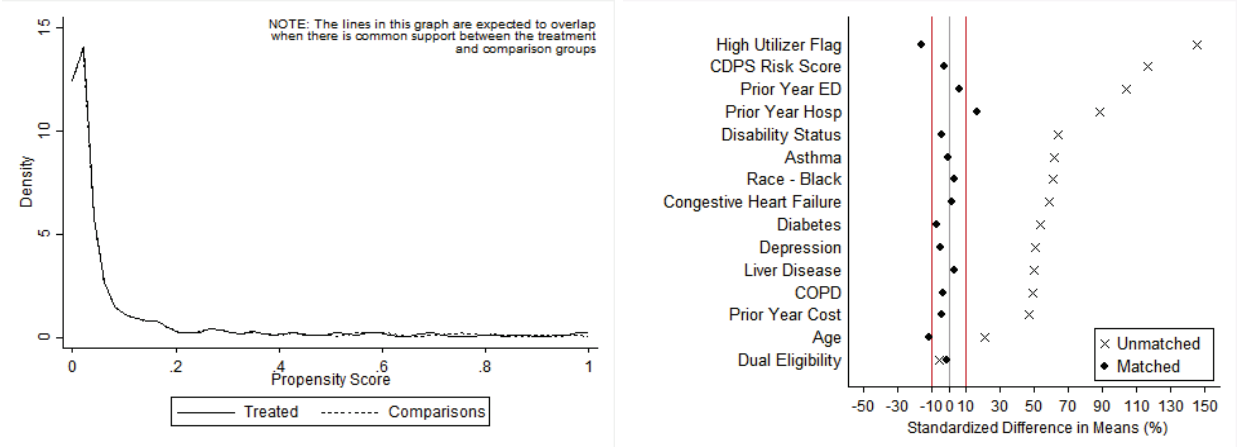
Providence Portland Medical Center

Health Resilience Program Analysis

Exhibit D.PPMC.1 presents common support and covariate balance across Health Resilience Program (HRP) treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between HRP participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year ED visits and costs (right graph). Although we were not able to achieve balance on the high utilizer indicator, prior year hospitalizations, and age overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

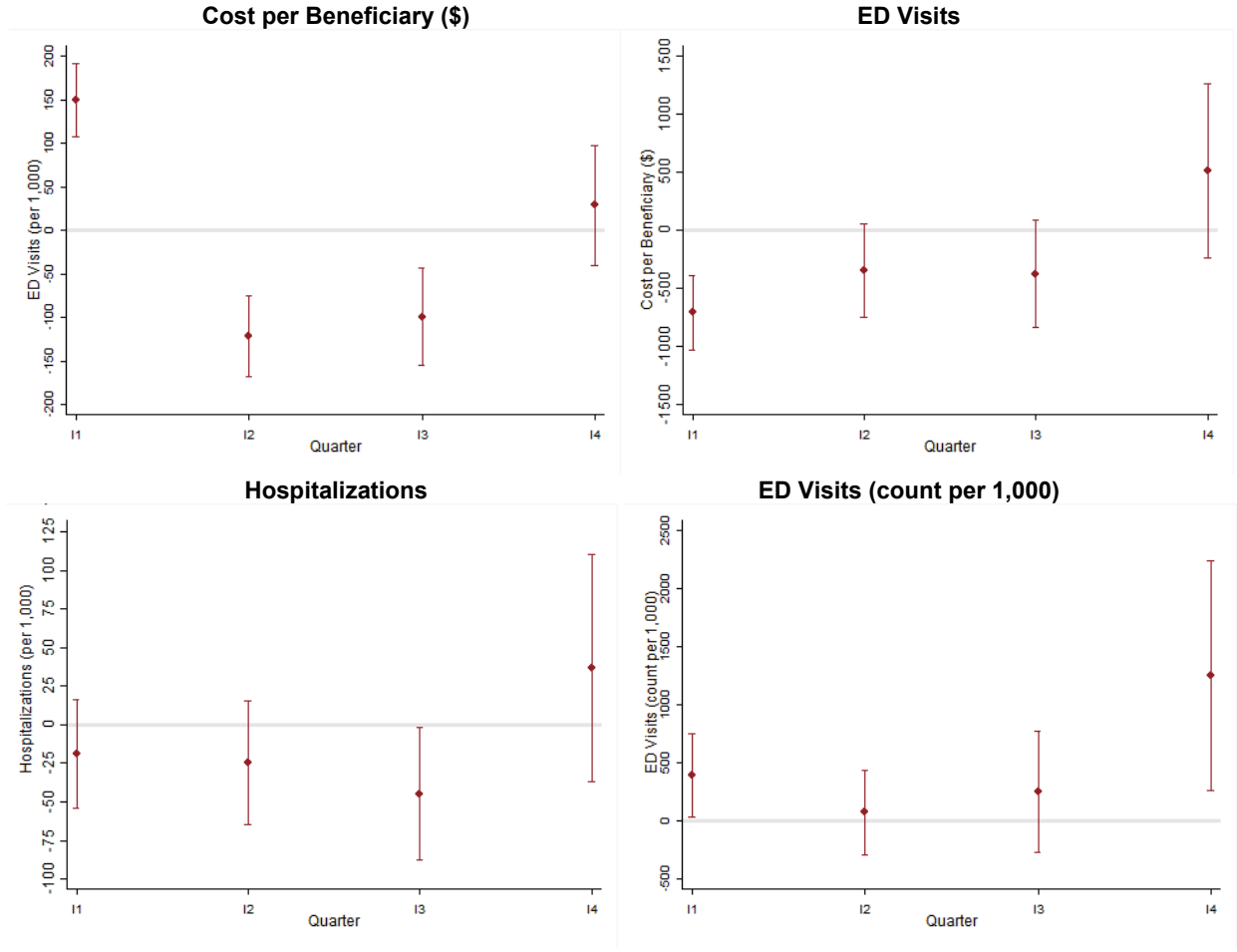
Exhibit D.PPMC.1: Common Support and Covariate Balance for HRP and Comparison Participants



Impact of HRP Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PPMC.2 displays the results of the quarterly fixed effects DID models.[395]

[395] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I4) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.PPMC.2: Impact of the Health Resilience Program on Outcomes by Quarter

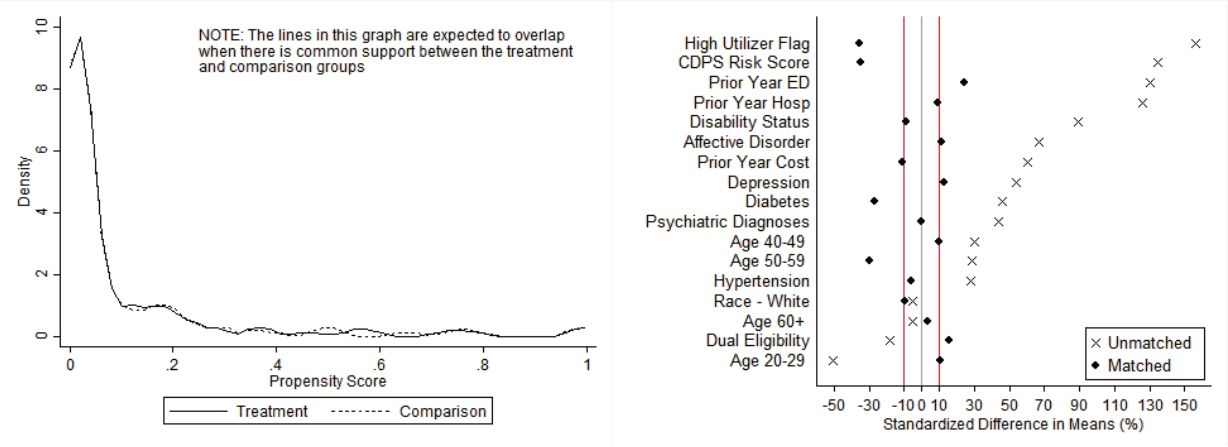


New Directions Program Analysis

Exhibit D.PPMC.3 presents common support and covariate balance across New Directions Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between New Directions participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year hospitalizations and costs (right graph). Although we were not able to achieve balance on several covariates, including prior year ED visits, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

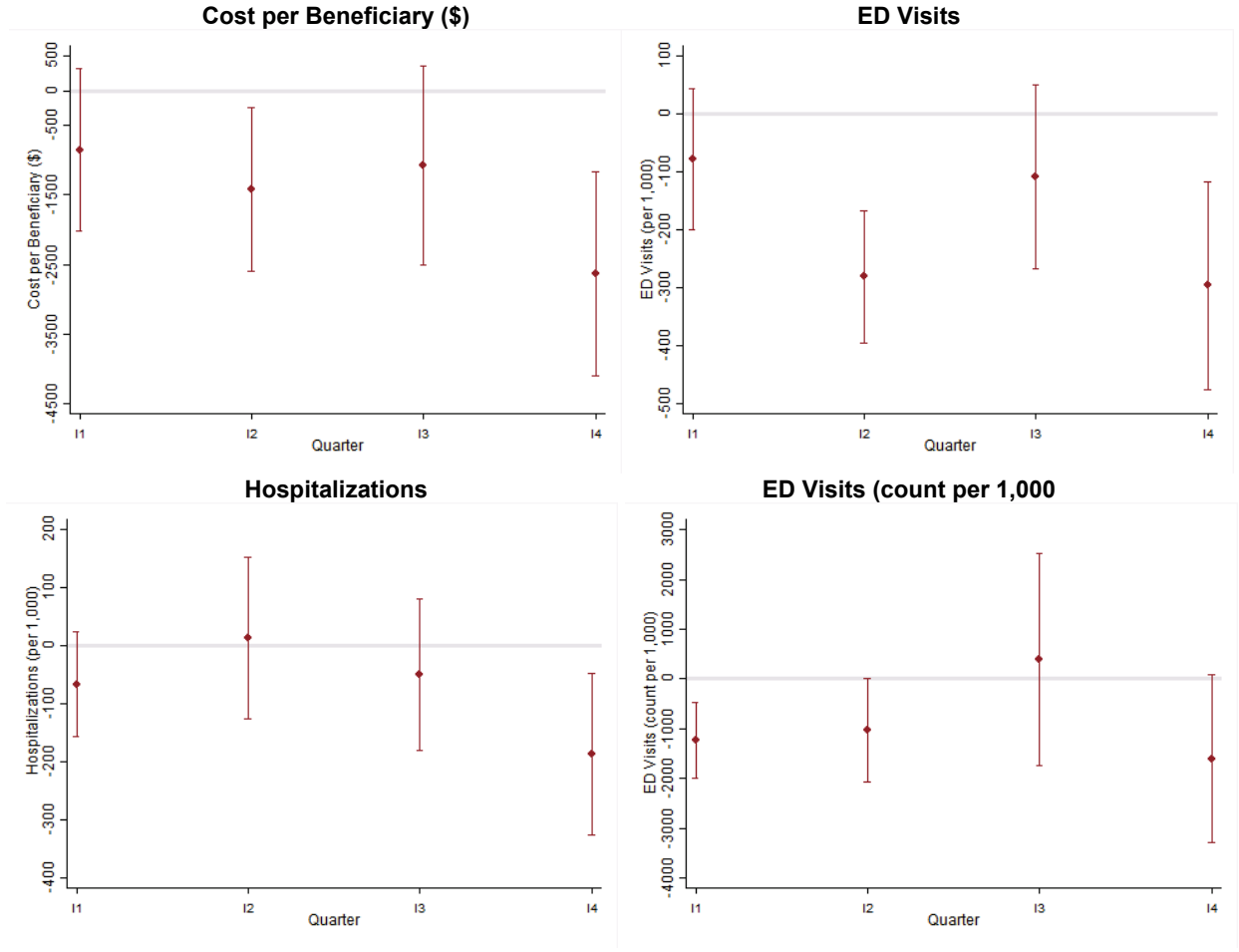
Exhibit D.PPMC.3: Common Support and Covariate Balance for New Directions and Comparison Participants



Impact of the New Directions Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PPMC.4 displays the results of the quarterly fixed effects DID models.[396]

[396] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I4) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.PPMC.4: Impact of the New Directions Program on Outcomes by Quarter

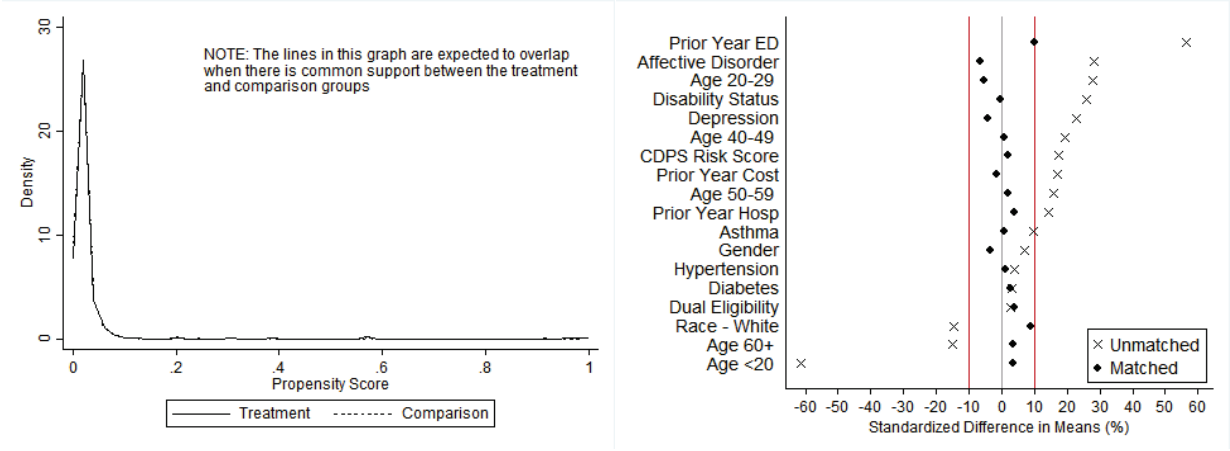


ED Guides Program Analysis

Exhibit D.PPMC.5 presents common support and covariate balance across ED Guides Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between ED Guides participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

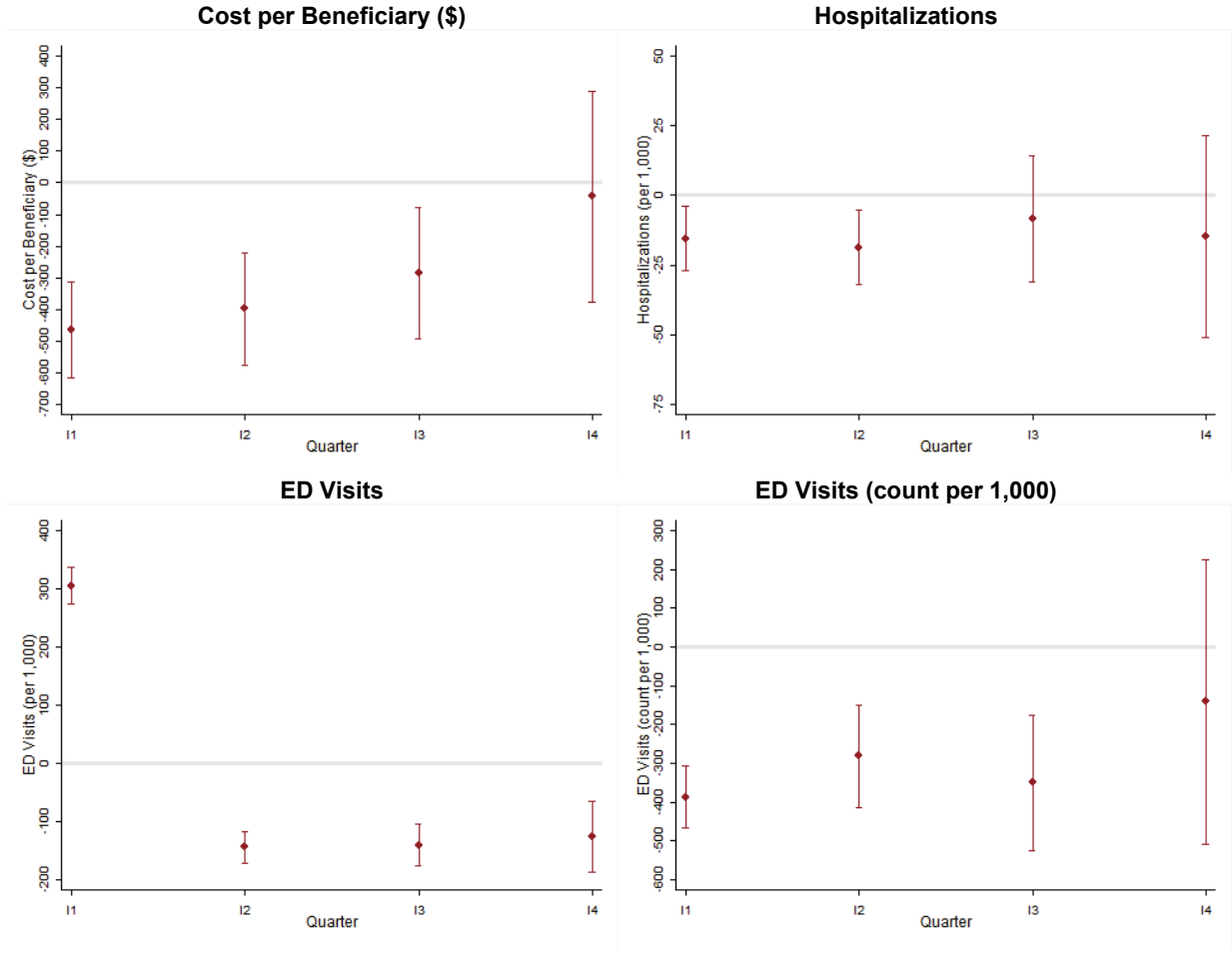
Exhibit D.PPMC.5: Common Support and Covariate Balance for ED Guides and Comparison Participants



Impact of the ED Guides Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PPMC.6 displays the results of the quarterly fixed effects DID models.[397]

[397] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I4) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.PPMC.6: Impact of the ED Guides Program on Outcomes by Quarter

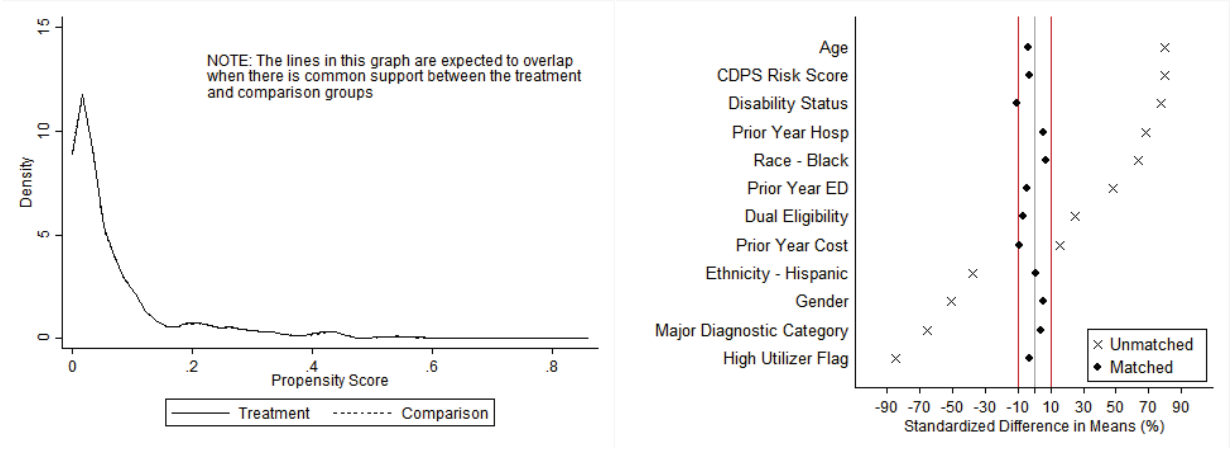


Standard Transitions Program Analysis

Exhibit D.PPMC.7 presents common support and covariate balance across Standard Transitions Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between Standard Transitions participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.PPMC.7: Common Support and Covariate Balance for Standard Transitions and Comparison Participants

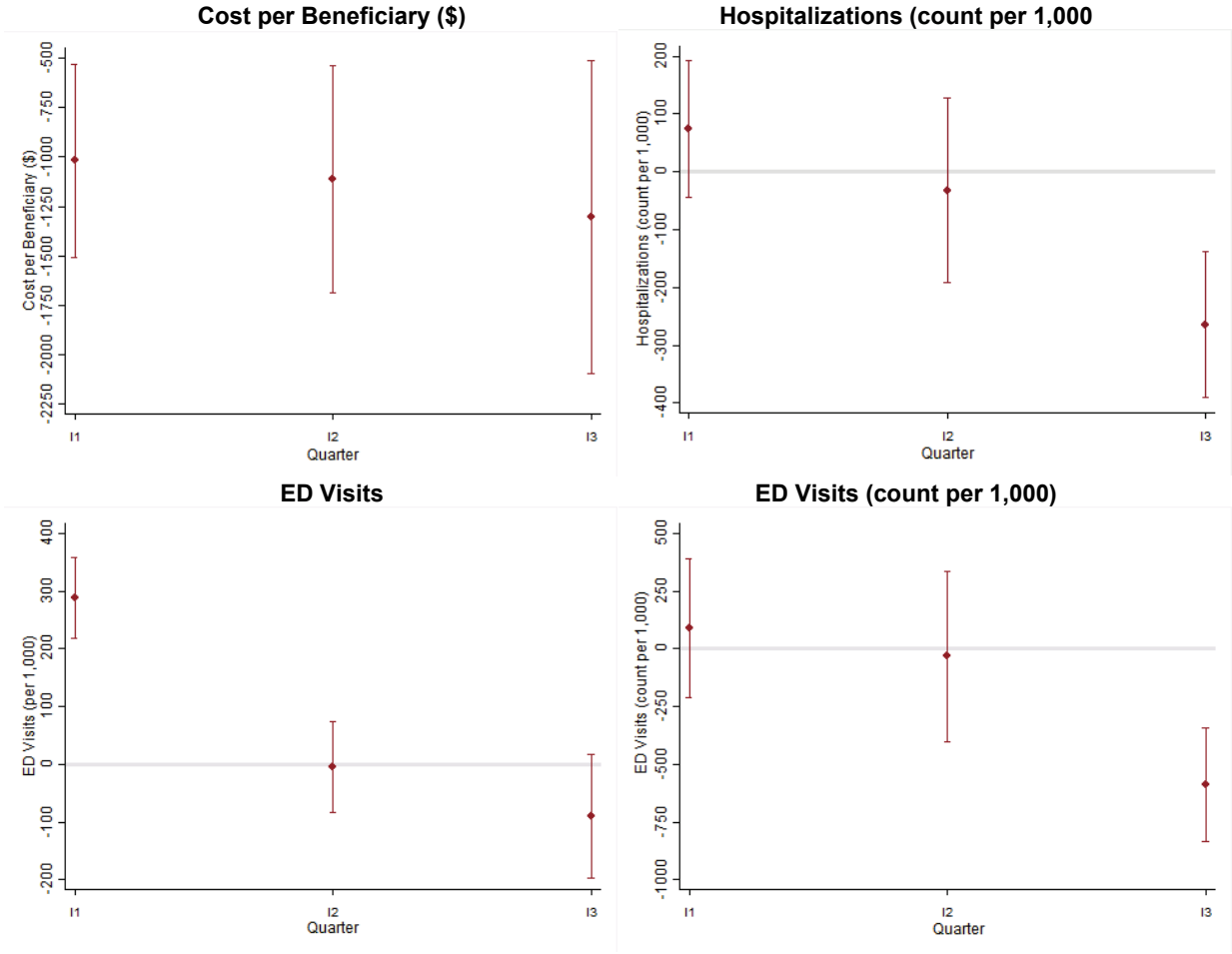


Impact of the Standard Transitions Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PPMC.8 displays the results of the quarterly fixed effects DID models.[398, 399]

[398] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I4) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

[399] Adjustment factors include age, gender, race, dual eligibility indicator, CDPS risk score, medical conditions (asthma, affective disorder, depression, diabetes and hypertension) and disability indicator.

Exhibit D.PPMC.8: Impact of the Standard Transitions Program on Outcomes by Quarter

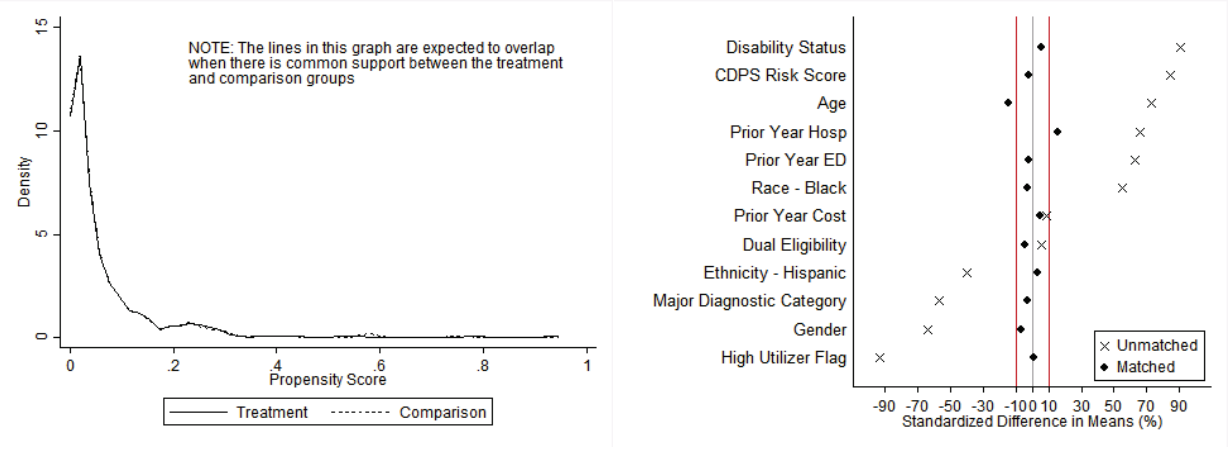


C-Train Program Analysis

Exhibit D.PPMC.9 presents common support and covariate balance across C-TRAIN Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between C-TRAIN participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year ED visits and costs (right graph). Although we were not able to achieve balance on age and prior year hospitalizations, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

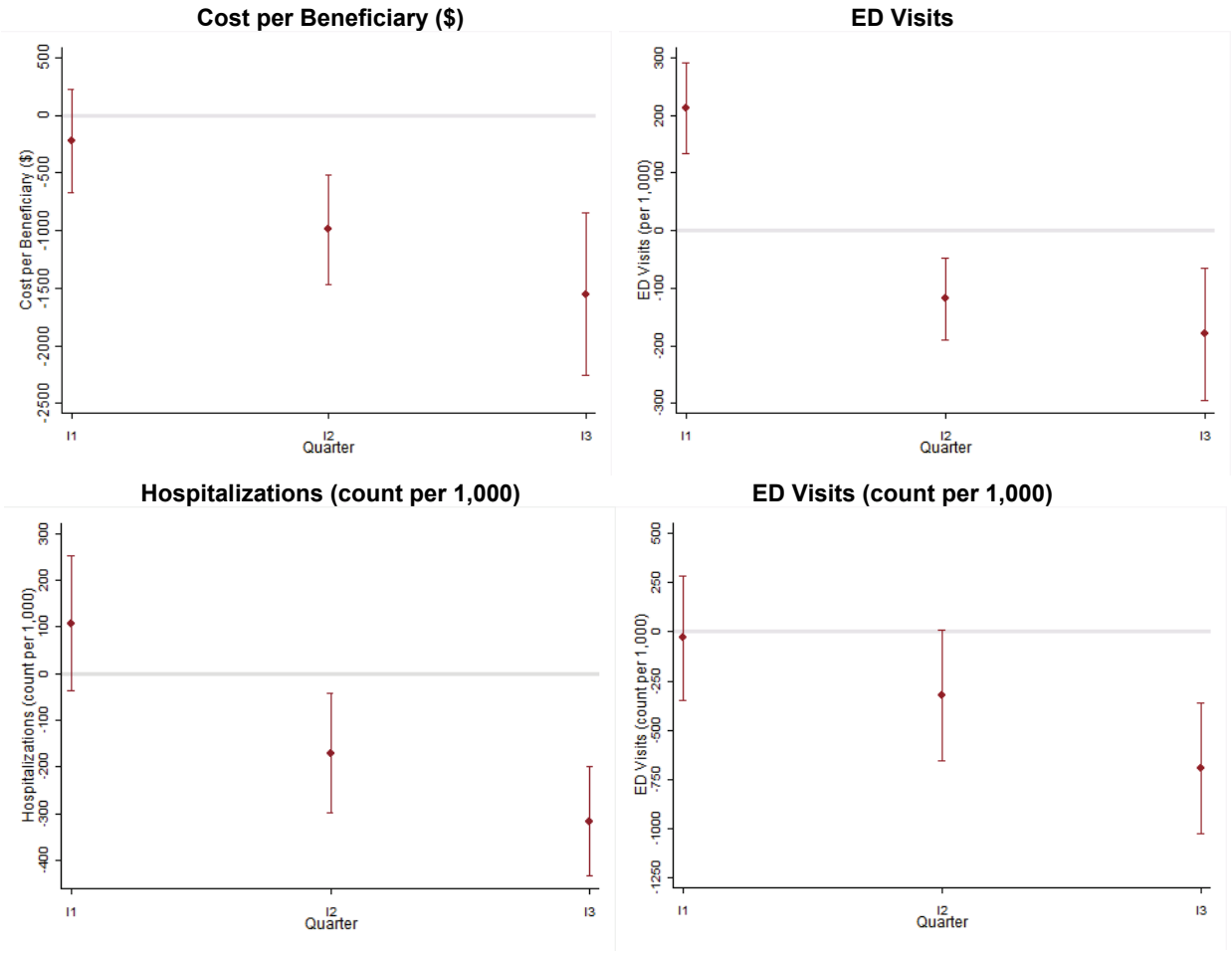
Exhibit D.PPMC.9: Common Support and Covariate Balance for C-TRAIN and Comparison Participants



Impact of the Standard Transitions Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.PPMC.10 displays the results of the quarterly fixed effects DID models.[400]

[400] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1-I4) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.PPMC.10: Impact of the C-TRAIN Program on Outcomes by Quarter

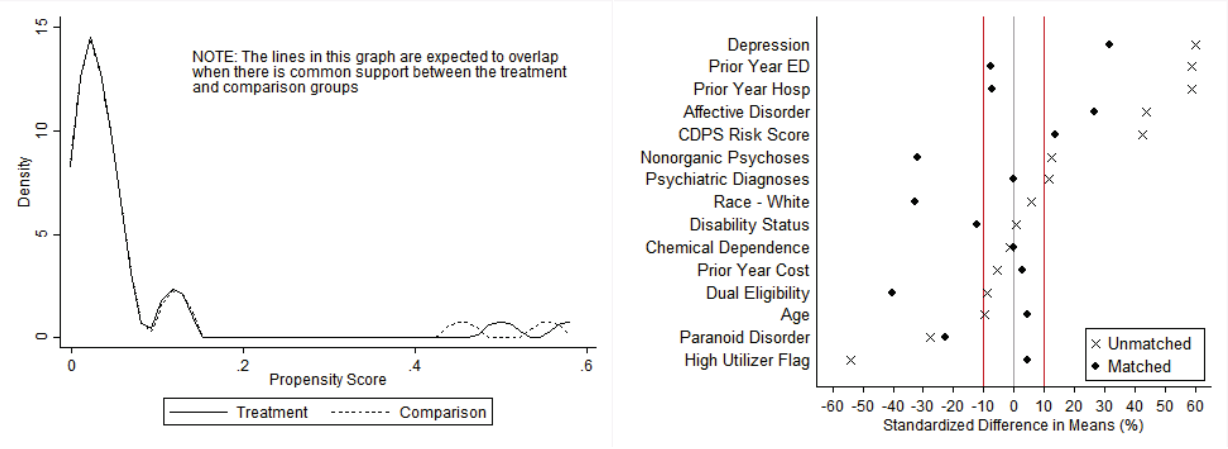


ITT Program Analysis

Exhibit D.PPMC.11 presents common support and covariate balance across ITT Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between ITT participants and the comparison group to <10% standardized bias) with respect to age, the high utilizer indicator, and prior-year utilization and costs (right graph). Although we were not able to achieve balance on mental health indicators, overall, the chart indicates that propensity score matching improved the comparability of the treatment and comparison group.

Exhibit D.PPMC.11: Common Support and Covariate Balance for ITT and Comparison Participants



Impact of the ITT Program in Each Quarter of Enrollment. Due to the limitations of available data, analysis of the ITT intervention is restricted to summary statistics presented in the awardee chapter and does not include quarterly fixed effects estimates and charts.

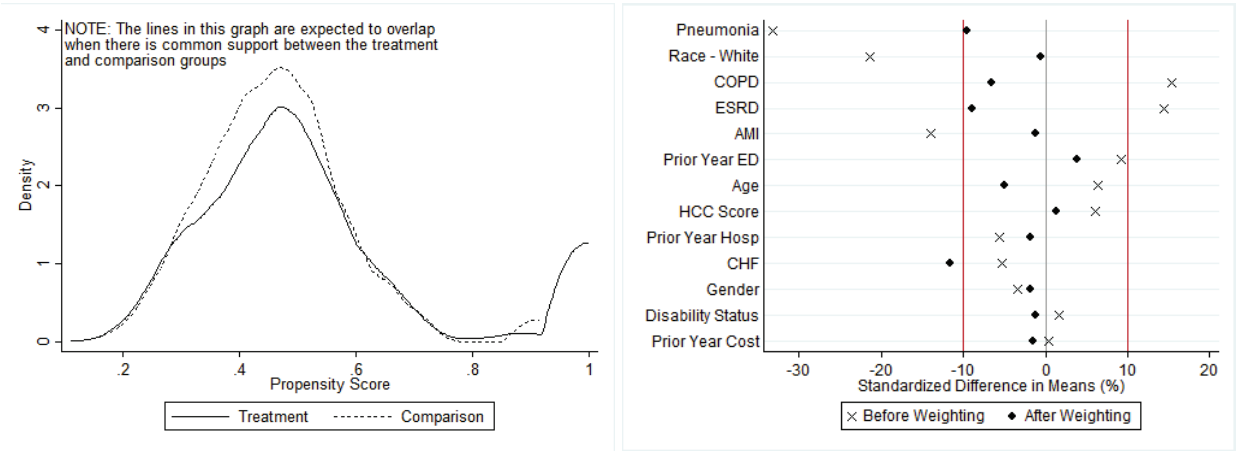
St. Francis Healthcare Foundation of Hawaii

Hospital Analysis

Exhibit D.HOPE.1 presents common support and covariate balance across H.O.P.E. post-acute care program treatment and comparison group beneficiary-episodes.

- After SMR weighting, we observe a high level of overlap in the distribution of estimated propensity scores across H.O.P.E and comparison group beneficiary-episodes (left graph).
- On the balance graphs, we show that weighting has achieved balance (i.e., reduced the difference between H.O.P.E. and comparison group beneficiary-episodes to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph). Although we were not able to achieve balance on the CHF indicator, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

Exhibit D.HOPE.1: Common Support and Covariate Balance for H.O.P.E and Comparison Beneficiary-Episodes, Hospital Analysis

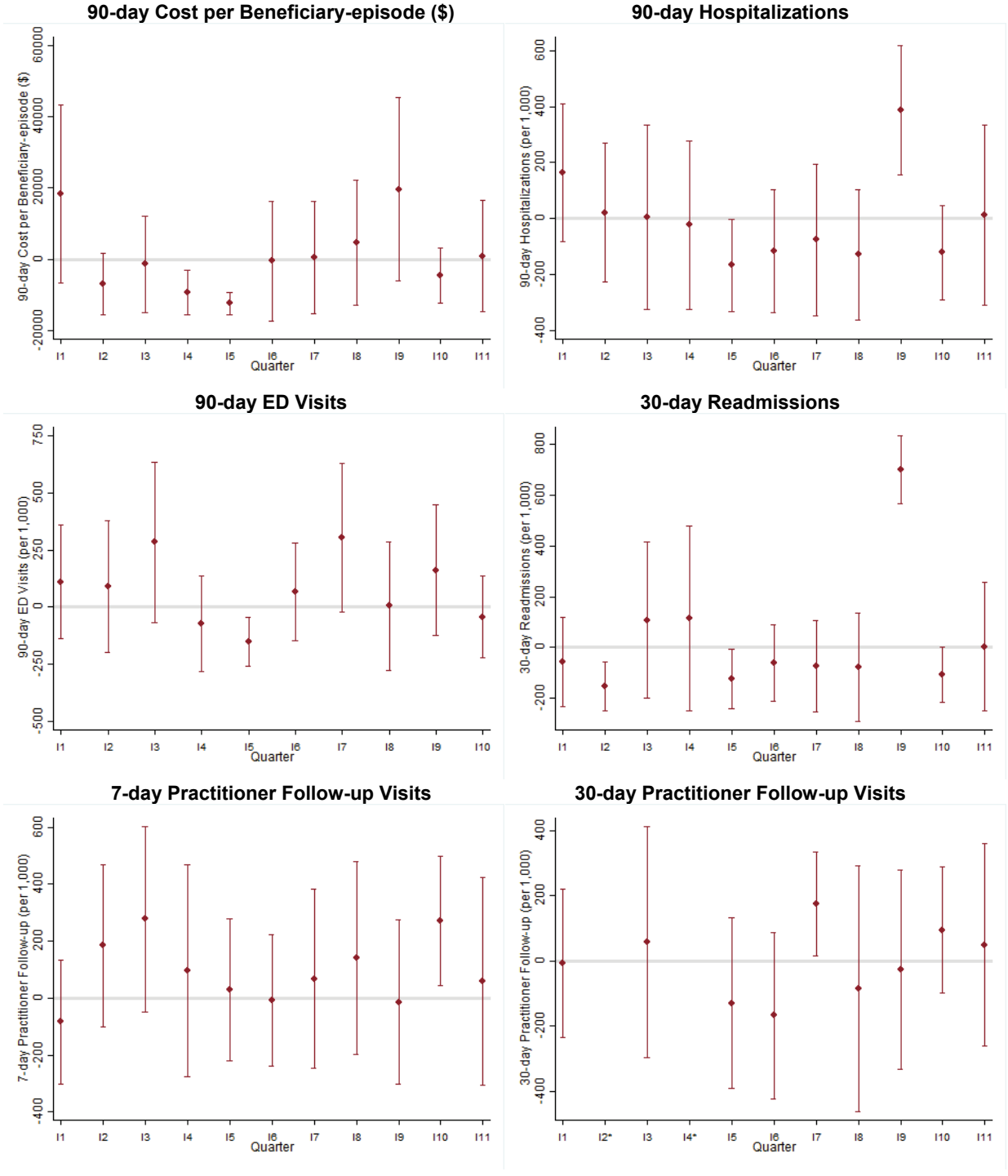


Impact of H.O.P.E Program in Each Quarter of Enrollment, Hospital Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.HOPE.2 displays the results of the quarterly fixed effects DID models.[401,402]

[401] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I11) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

[402] For the 30-day follow-up measure, we are unable to calculate an adjusted difference for two post-intervention quarters (I2 and I4) because all beneficiary-episodes in the H.O.P.E. program had 30-day practitioner follow-up.

Exhibit D.HOPE.2: Impact of the H.O.P.E Program on Outcomes by Quarter, Hospital Analysis

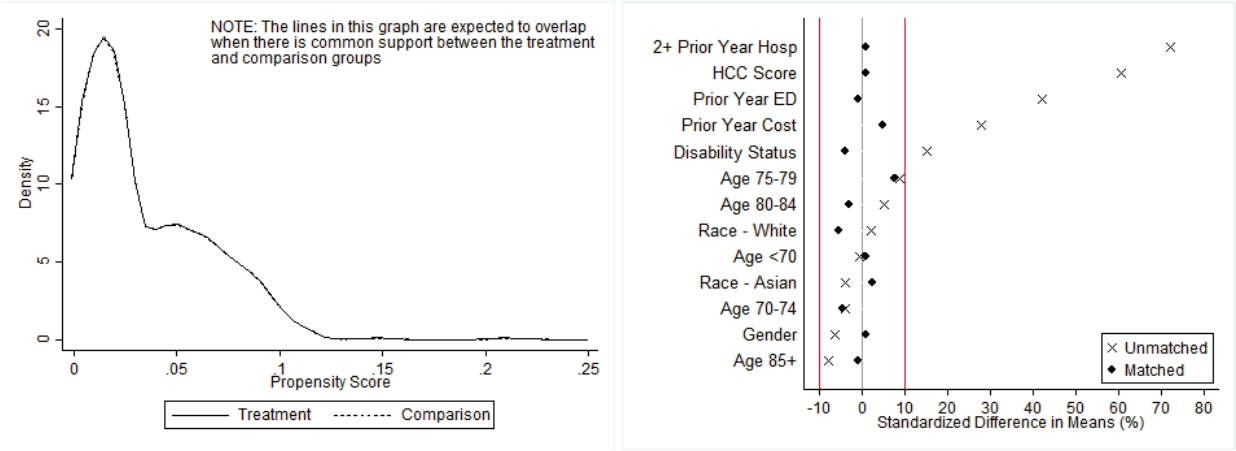


Community Analysis

Exhibits D.HOPE.3 presents common support and covariate balance across H.O.P.E treatment and comparison group beneficiaries in the community arm.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between H.O.P.E. participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization (right graph).

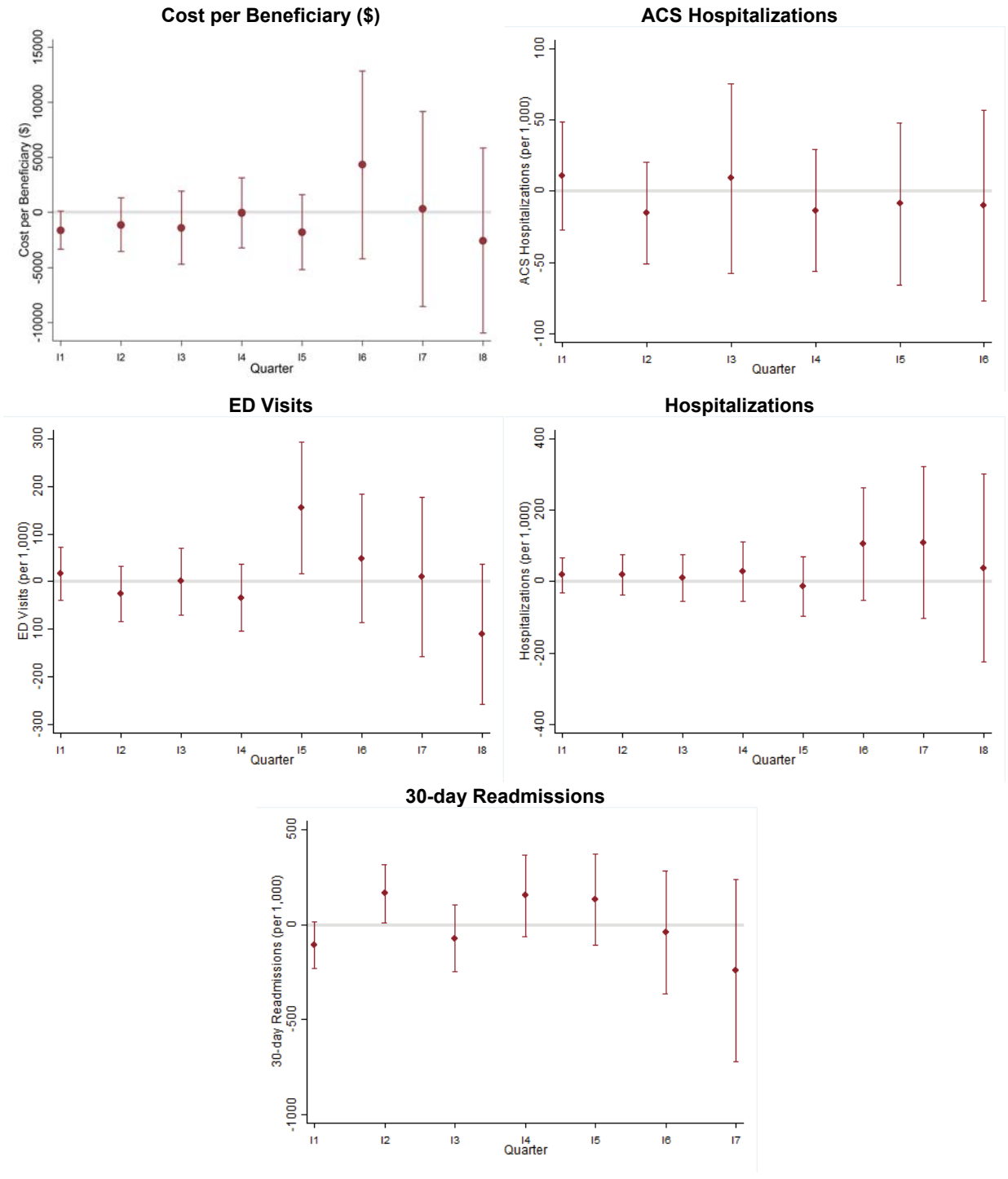
Exhibit D.HOPE.3: Common Support and Covariate Balance for H.O.P.E. and Comparison Group Participants, Community Analysis



Impact of H.O.P.E Program in Each Quarter of Enrollment, Community Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.HOPE.4 displays the results of the quarterly fixed effects DID models.[403]

[403] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.HOPE.4: Impact of the H.O.P.E Program on Outcomes by Quarter, Community Analysis

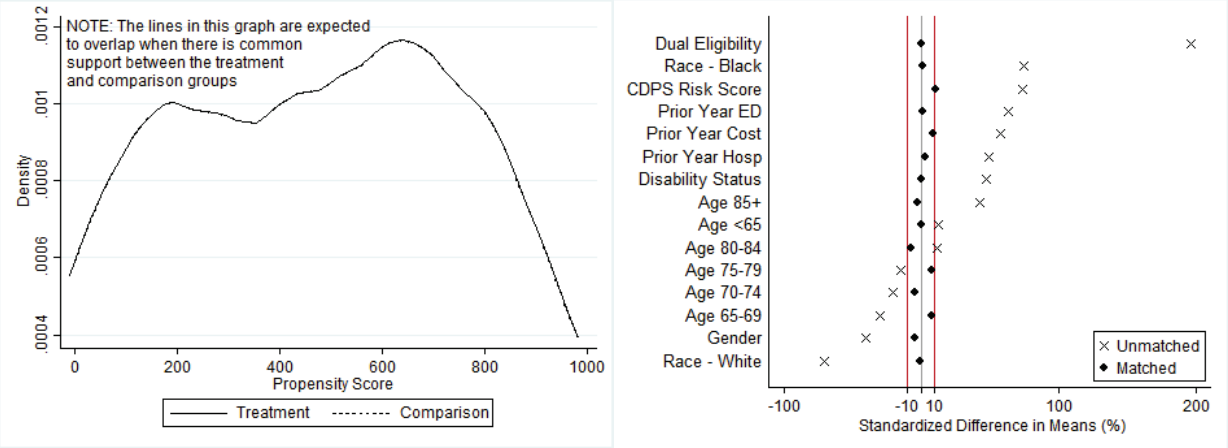


South Carolina Research Foundation

Exhibit D.SCRF.1 presents common support and covariate balance across HOMECARE+ treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between HOMECARE+ participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

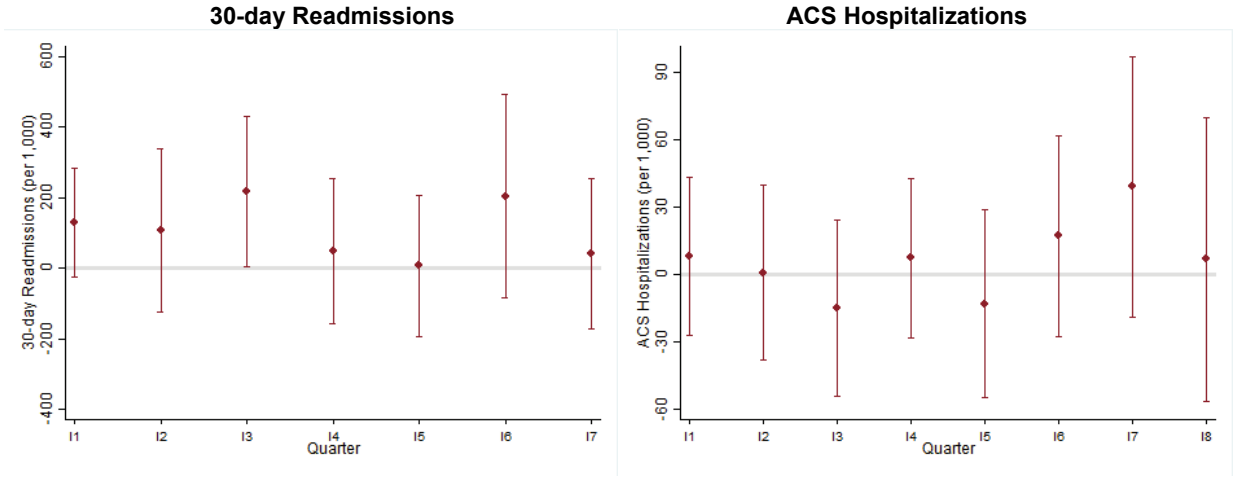
Exhibit D.SCRF.1: Common Support and Covariate Balance for HOMECARE+ and Comparison Participants



Impact of HOMECARE+ Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter for readmissions and ACS hospitalizations are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.SCRF.2 displays the results of the quarterly fixed effects DID models.[404] Findings from the QFE models for total cost of care, hospitalizations, and ED visits departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

[404] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.SCRF.2: Impact of the HOMECARE+ Program on Outcomes by Quarter



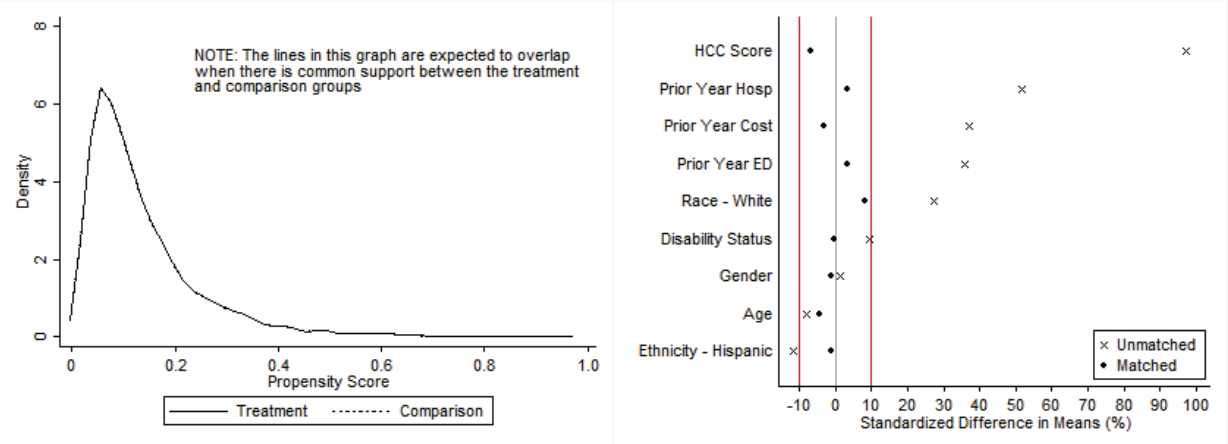
Sutter Health Corporation

End-of-life (EOL) Analysis

Exhibit D.AIM.1 presents common support and covariate balance across AIM Program treatment and comparison group beneficiaries for the EOL analysis.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between AIM participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.AIM.1: Common Support and Covariate Balance for AIM and Comparison Participants, EOL Analysis



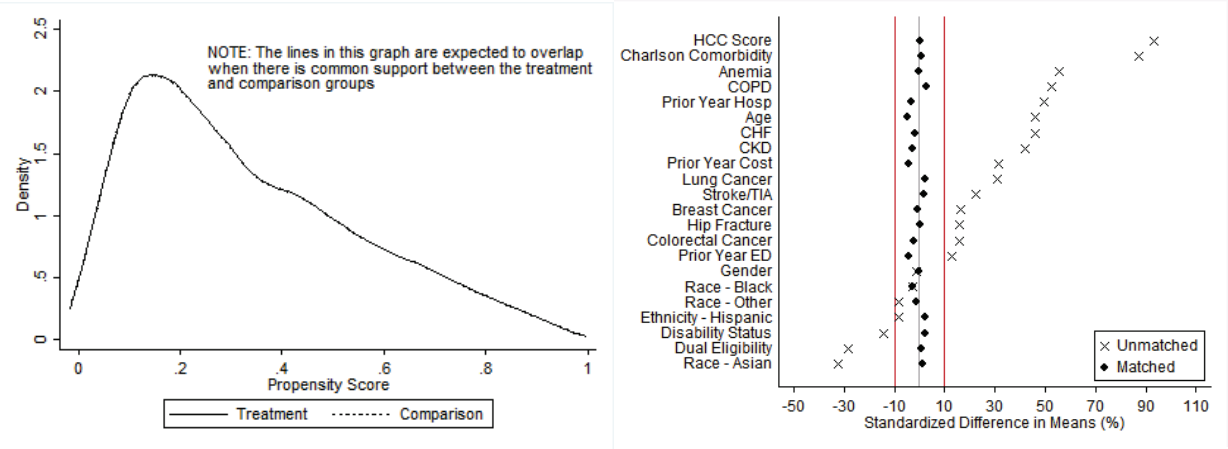
Supplemental Analysis: All Beneficiaries

As noted in the Sutter Health awardee chapter, our analysis of the experience of all enrolled beneficiaries is challenged by significant differences between treatment and comparison groups. We present both a summative DID and quarterly fixed effects DID analysis in this section, illustrating biases that render these analyses of limited value.

Exhibit D.AIM.2 presents common support and covariate balance across AIM Program treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between AIM participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.AIM.2: Common Support and Covariate Balance for AIM and Comparison Participants, All Beneficiaries Analysis



Impact of AIM Program, All Beneficiaries. Exhibit D.AIM.3 displays the average quarterly and aggregate impact of the AIM program for its participants relative to the comparison group, across the observed enrollment period (13 enrollment quarters).[405] Models are adjusted for age, gender, race/ethnicity, dual eligibility indicator, disability eligibility indicator, HCC score, diagnosis of chronic kidney disease, congestive heart failure, chronic obstructive pulmonary disease, hip fracture, stroke/TIA, breast cancer, colorectal cancer, lung cancer, anemia, and Charlson Comorbidity Score.

Since AIM targets participants with a prognosis of less than one year, we perform sensitivity analyses that restrict follow-up to the first 12 months. We find that 2,089 (48 percent) of AIM enrollees died within the first year of enrollment in the program, and 2,329 (54 percent) died within the first 1.5 years of the program. The finding that about half of participants survive at least 18 months following enrollment is surprising, and may reflect the awardee's interest in broadening the intervention scope to reach prospectively eligible beneficiaries at an earlier point in their illness trajectory. Observations from NORC interviews with program leadership and focus groups with caregivers and AIM-enrolled beneficiaries supports this trend; program leaders have commented on their aspiration to enroll participants with a prognosis of 24 months or fewer, in order to maximize the positive impacts of AIM on health and functioning, as well as quality of life, utilization, and, ultimately, cost of care. We find the following, relative to the comparison group:

- **Cost:** A statistically significant increase in the total cost of care per quarter ($2,492 per beneficiary) across the entire enrollment period, an estimate that increases (to $3,845 per beneficiary) for the first 12 months of enrollment. These findings translate into aggregate costs of approximately $36 million, if estimated over the entire enrollment period, or $42 million, estimated over the first 12 months of enrollment.
- **Utilization:** A significant increase in hospitalizations (22 more per 1,000 beneficiaries); a significant decrease in ED visits (12 more per 1,000 beneficiaries); and a significant increase in 30-day readmissions (69 more) across the enrollment period, with similar findings for the first 12 months of enrollment.

[405] See Appendix C for more about our analytic approach.

- **Quality of Care:** A non-significant increase in the likelihood of ACS hospitalizations over the entire enrollment period, that becomes a significant increase during the first 12 months of enrollment (11 more per 1,000 beneficiaries).

Exhibit D.AIM.3: Impact of the AIM Program on Outcomes for Medicare Beneficiaries

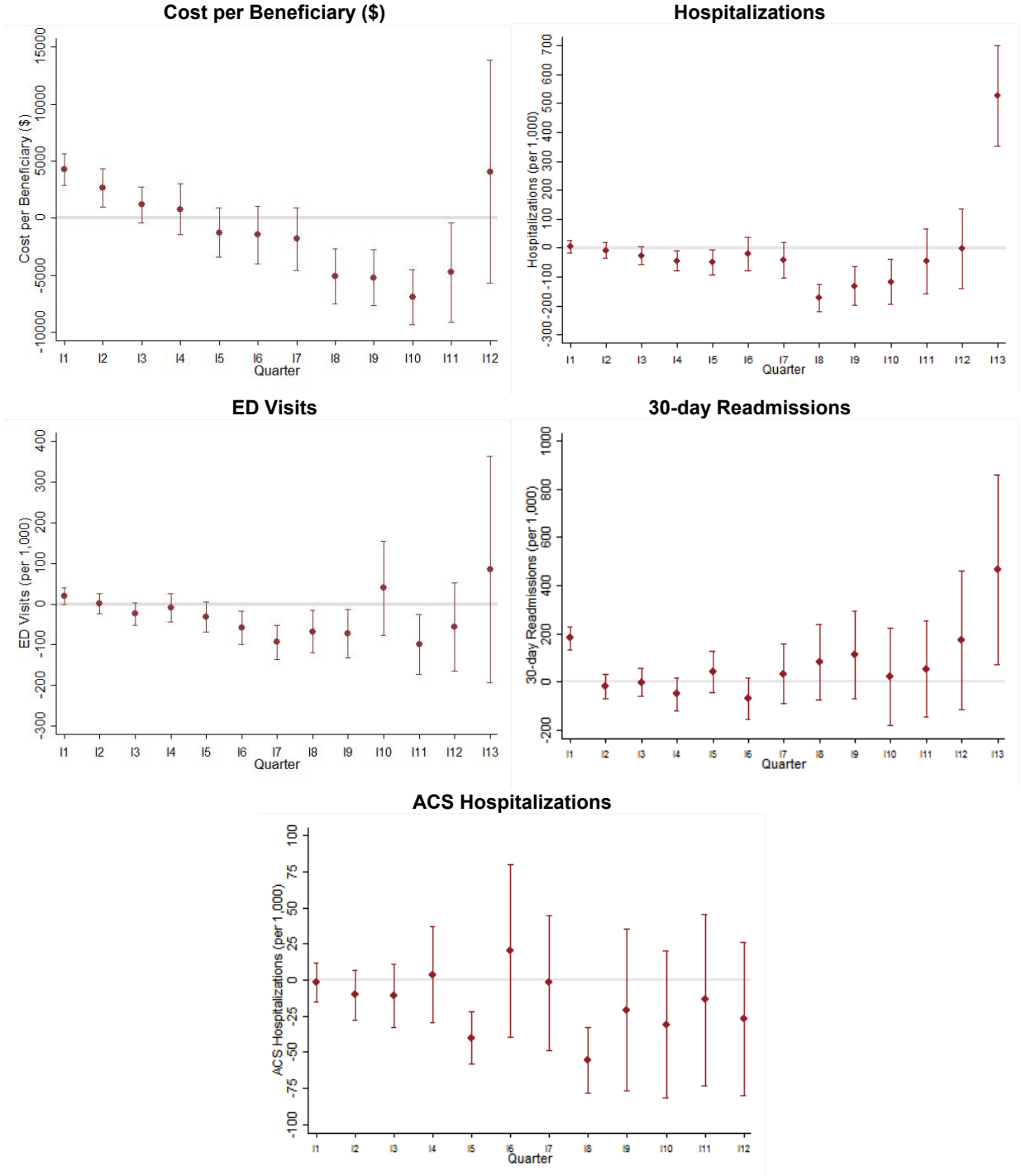
AVERAGE QUARTERLY IMPACT[§]		
Outcome Measure (per 1,000 beneficiaries unless noted)	**Adjusted Estimate [90% Confidence Interval]**	
	Entire Enrollment Period	**First 12 Months of Enrollment**
Total Cost of Care per Quarter per Beneficiary ($)	**$2,492 [$1,783, $3,201]*** **	**$3,845 [$3,061, $4,629]*** **
Hospitalizations	**22 [10, 34]*** **	**37 [24, 50]*** **
ED Visits	**12 [0.5, 24]***	**27 [15, 40]*** **
30-Day Readmissions	**69 [48, 90]*** **	**81 [58, 105]*** **
ACS Hospitalizations	4 [-3, 13]	**11 [2, 20]** **
AGGREGATE IMPACT[§§]		
Outcome Measure	**Adjusted Estimate [90% Confidence Interval]**	
	Entire Enrollment Period	**First 12 Months of Enrollment**
Total Cost of Care ($)	**$36,356,790 [$25,981,679, $46,731,900]*** **	**$42,474,257 [$33,784,922, $51,163,593]*** **
Hospitalizations	**317 [140, 494]*** **	**410 [270, 550]*** **
ED Visits	**177 [7, 346]***	**301 [164, 438]*** **
30-Day Readmissions	**280 [194, 367]*** **	**275 [197, 353]*** **
ACS Hospitalizations	69 [-51, 188]	**119 [22, 216]** **

NOTE: *p<0.10, **p<0.05, ***p<0.01.**Bolded** fonts indicate where results reach statistical significance. [§]Quarterly Impact is the average quarterly difference-in-differences estimate per quarter of program enrollment. [§§]Aggregate Impact is the total difference-in-differences estimate for all program participants across all observed quarters of program enrollment. Aggregate Impact is estimated for this awardee based on the total number of program participants (4,316), with an average length of program enrollment of 3.9 quarters, ranging from 1-13 quarters.

Impact of AIM Program in Each Quarter of Enrollment, All Beneficiary Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.AIM.4 displays the results of the quarterly fixed effects DID models.[406]

[406] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.AIM.4: Impact of the AIM Program on Outcomes by Quarter, All Beneficiaries Analysis

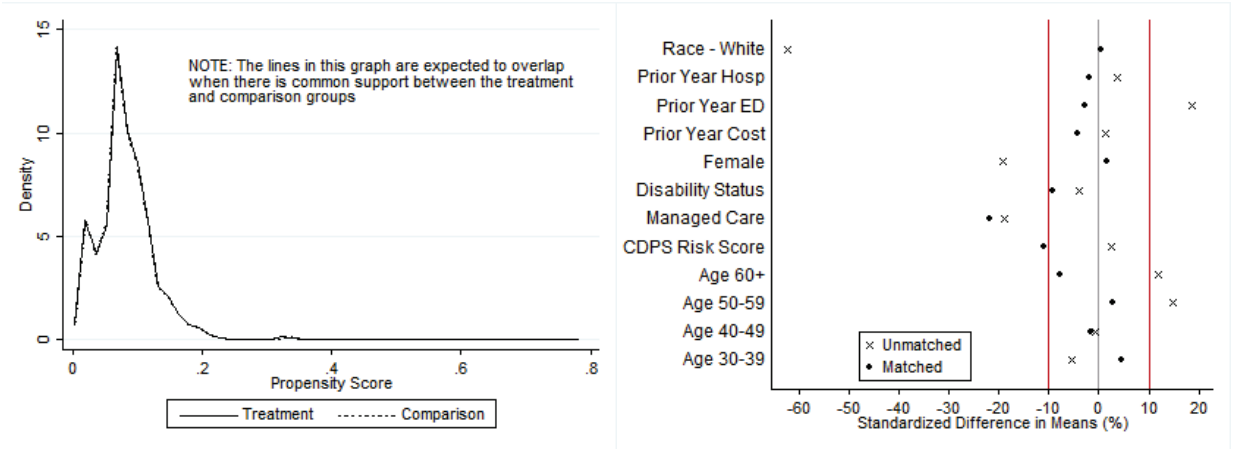


University Emergency Medical Services

Exhibit D.UEMS.1 presents common support and covariate balance across HealthiER treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between HealthiER participants and the comparison group to <10% standardized bias) with respect to demographic characteristics and prior-year utilization and costs (right graph). Although we were not able to achieve balance on the managed care and CDPS risk score indicators, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

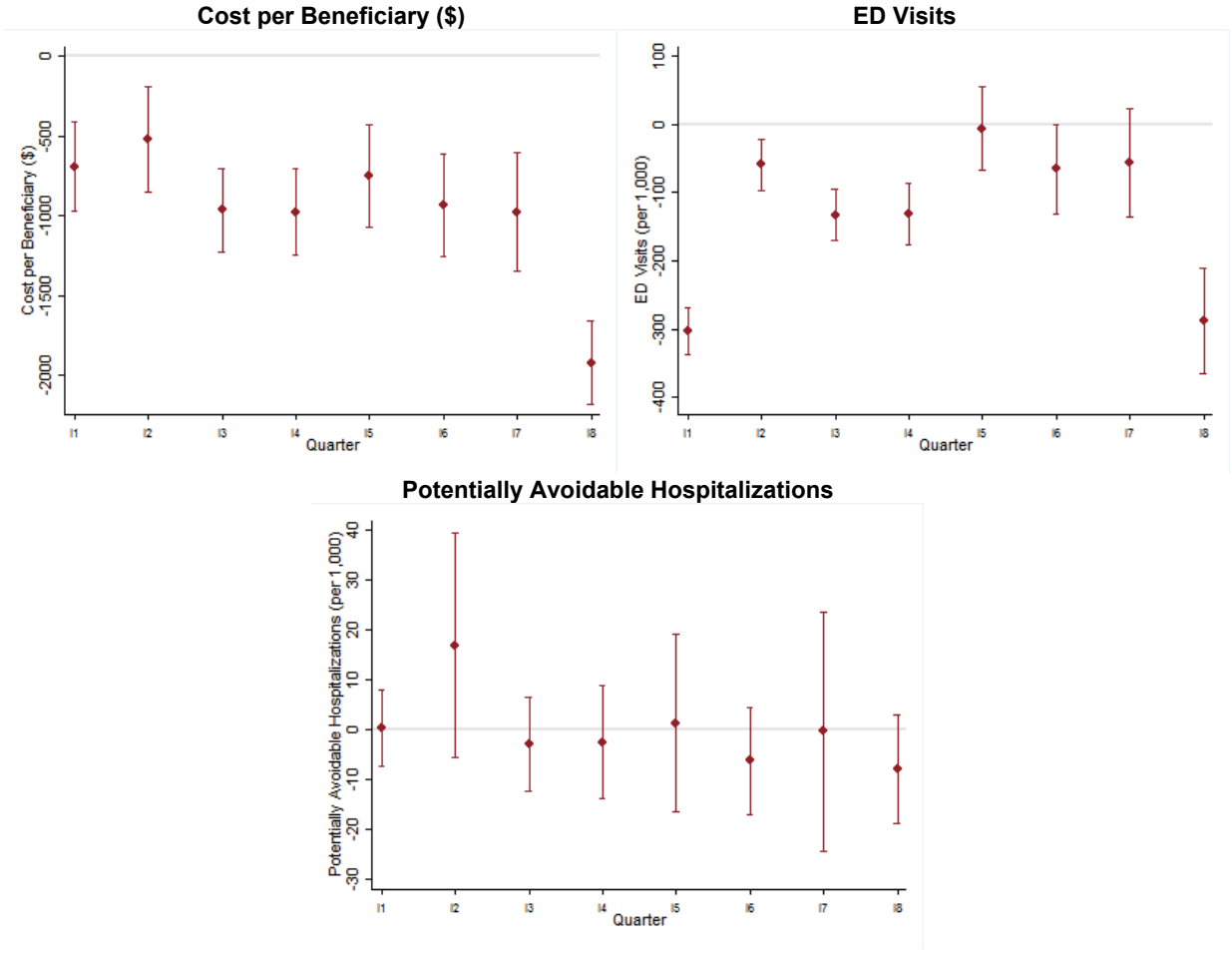
Exhibit D.UEMS.1: Common Support and Covariate Balance for HealthiER and Comparison Participants



Impact of HealthiER Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter for total cost of care, ED visits, and potentially avoidable hospitalizations are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.UEMS.2 displays the results of the quarterly fixed effects DID models.[407] Findings from the QFE models for hospitalizations and practitioner follow-up departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

[407] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.UEMS.2: Impact of the HealthiER Program on Outcomes by Quarter

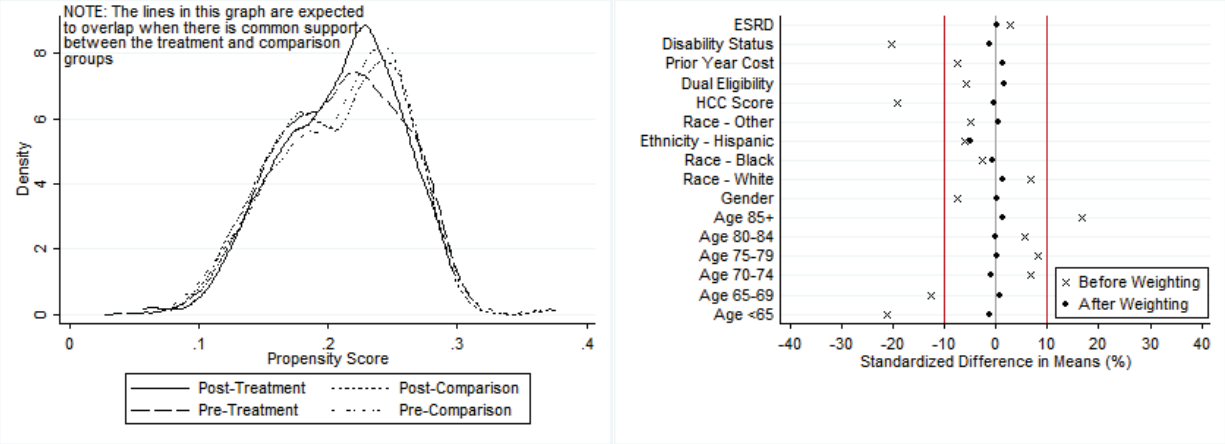


University of Iowa

Exhibit D.UIHC.1 presents common support and covariate balance across U Iowa post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes after relative weighting.

- After relative weighting, we observe a high level of overlap in the distribution of estimated propensity scores across U Iowa post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes (left graph).
- On the balance graph (right graph), we are able to show that the standardized difference between U Iowa post-treatment, post-comparison, pre-treatment, and pre-comparison group beneficiary-episodes across all covariates is negligible after incorporating relative weights.

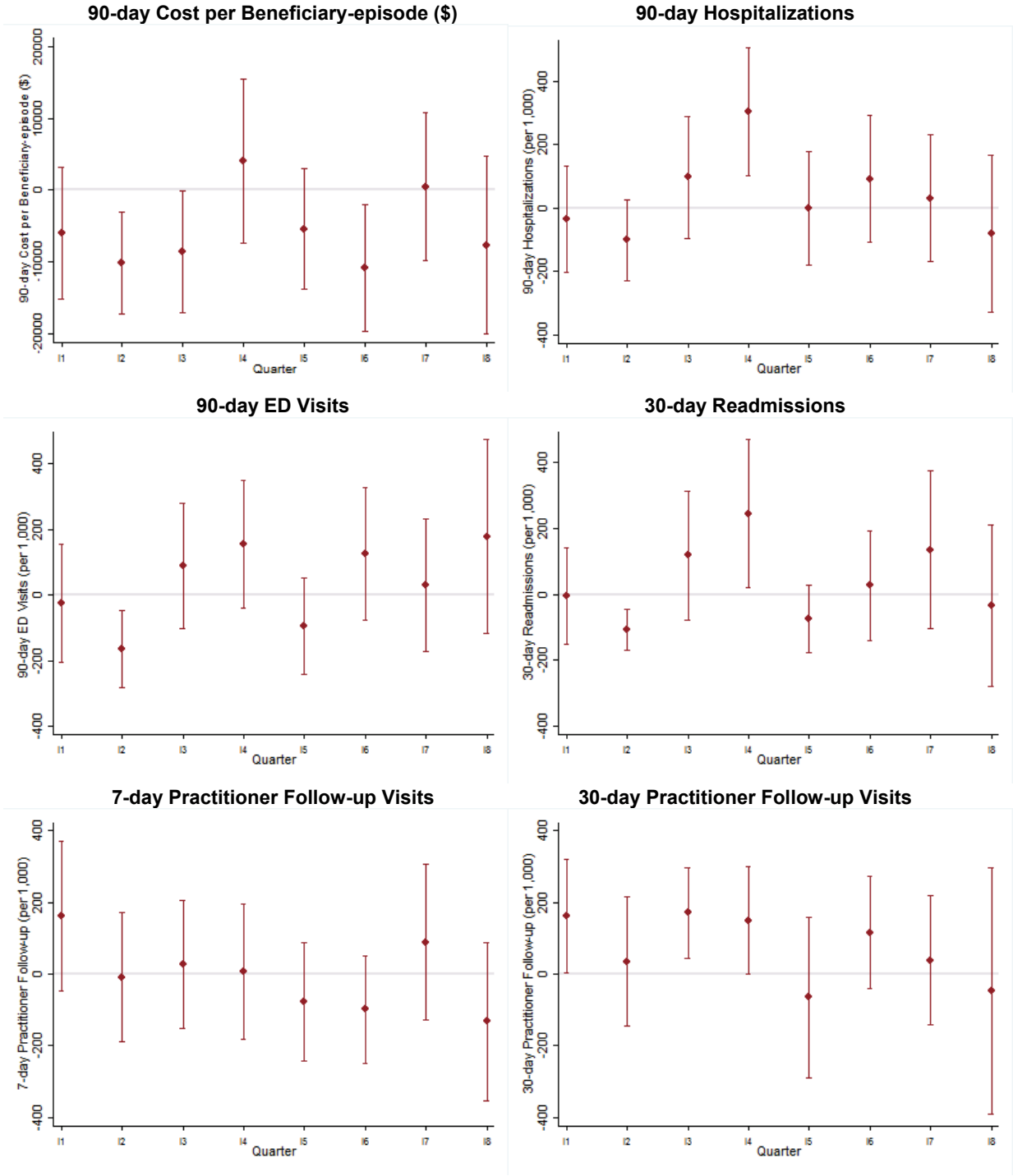
Exhibit D.UIHC.1: Common Support and Covariate Balance for U Iowa and Comparison Beneficiary-Episodes



Impact of U Iowa Program in Each Quarter of Enrollment. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.UIHC.2 displays the results of the quarterly fixed effects DID models. [408]

[408] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.UIHC.2: Impact of the U Iowa Program on Outcomes by Quarter

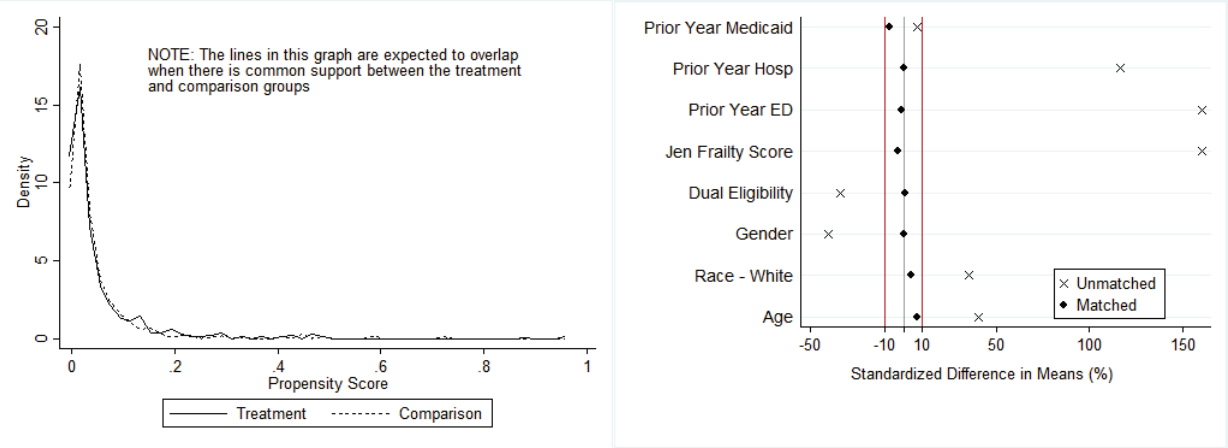


University of New Mexico

Exhibit D.ECHO.1 presents common support and covariate balance across ECHO treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between ECHO participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.ECHO.1: Common Support and Covariate Balance for ECHO and Comparison Participants



Impact of ECHO Program in Each Quarter of Enrollment. Findings from the quarterly fixed effects models of impact in each intervention departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

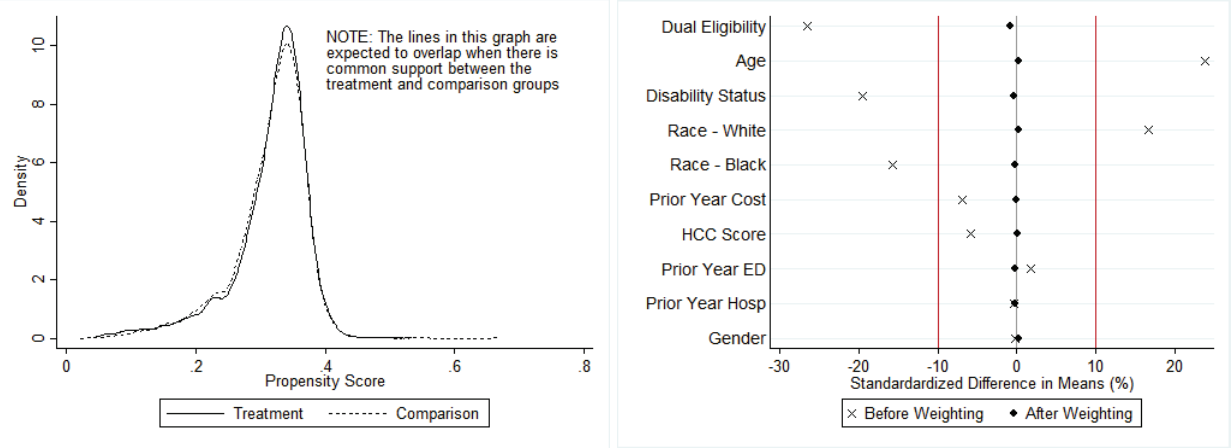
University of North Texas Health Science Center

Skilled Nursing Facility (SNF) Analysis

Exhibit D.BSLTOC.1 presents common support and covariate balance across BSLTOC program treatment and comparison group beneficiary-episodes in the SNF arm of the intervention.

- After SMR weighting, we observe a high level of overlap in the distribution of estimated propensity scores across BSLTOC and comparison group beneficiary-episodes (left graph).
- On the balance graphs, we show that weighting has achieved balance (i.e., reduced the difference between BSLTOC and comparison group beneficiary-episodes to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and cost (right graph).

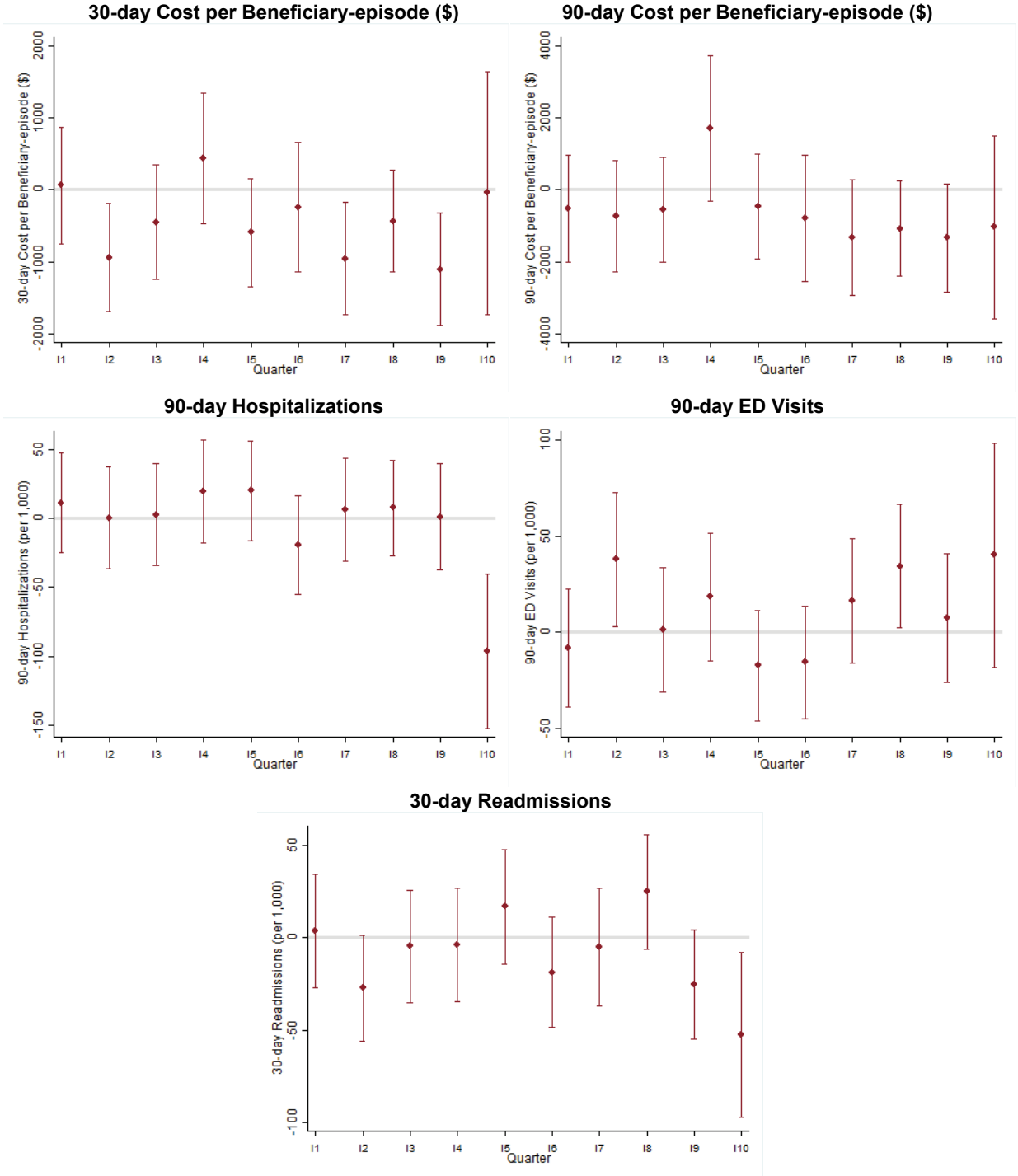
Exhibit D.BSLTOC.1: Common Support and Covariate Balance for BSLTOC and Comparison Beneficiary-Episodes, SNF Analysis



Impact of BSLTOC Program in Each Quarter of Enrollment, SNF Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.BSLTOC.2 displays the results of the quarterly fixed effects DID models.[409]

[409] For utilization measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I10) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.BSLTOC.2: Impact of the BSLTOC Program on Outcomes by Quarter, SNF Analysis

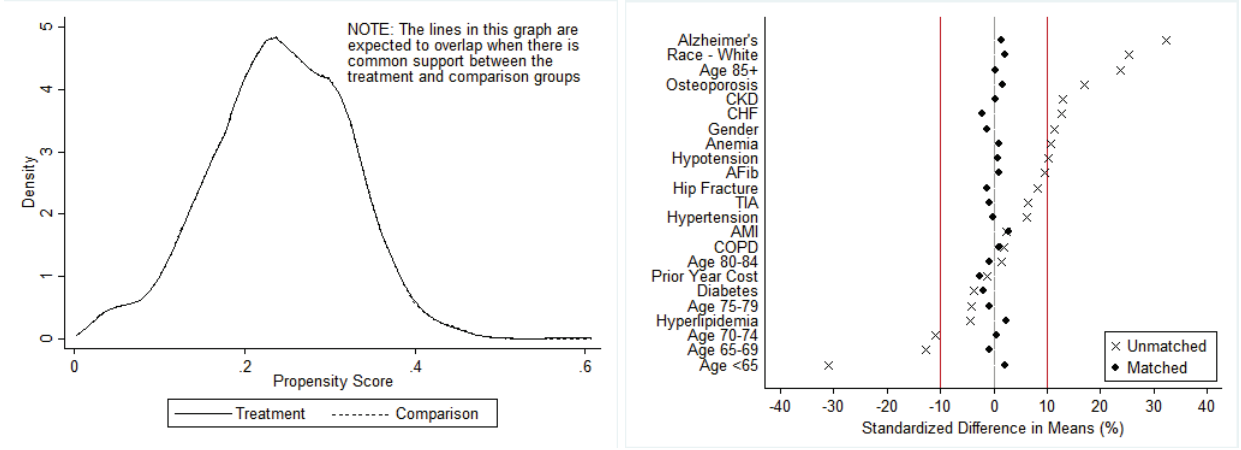


Assisted Living (AL) Analysis

Exhibit D.BSLTOC.3 presents common support and covariate balance across BSLTOC treatment and comparison group beneficiaries in the assisted living arm of the intervention.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between BSLTOC participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and cost (right graph).

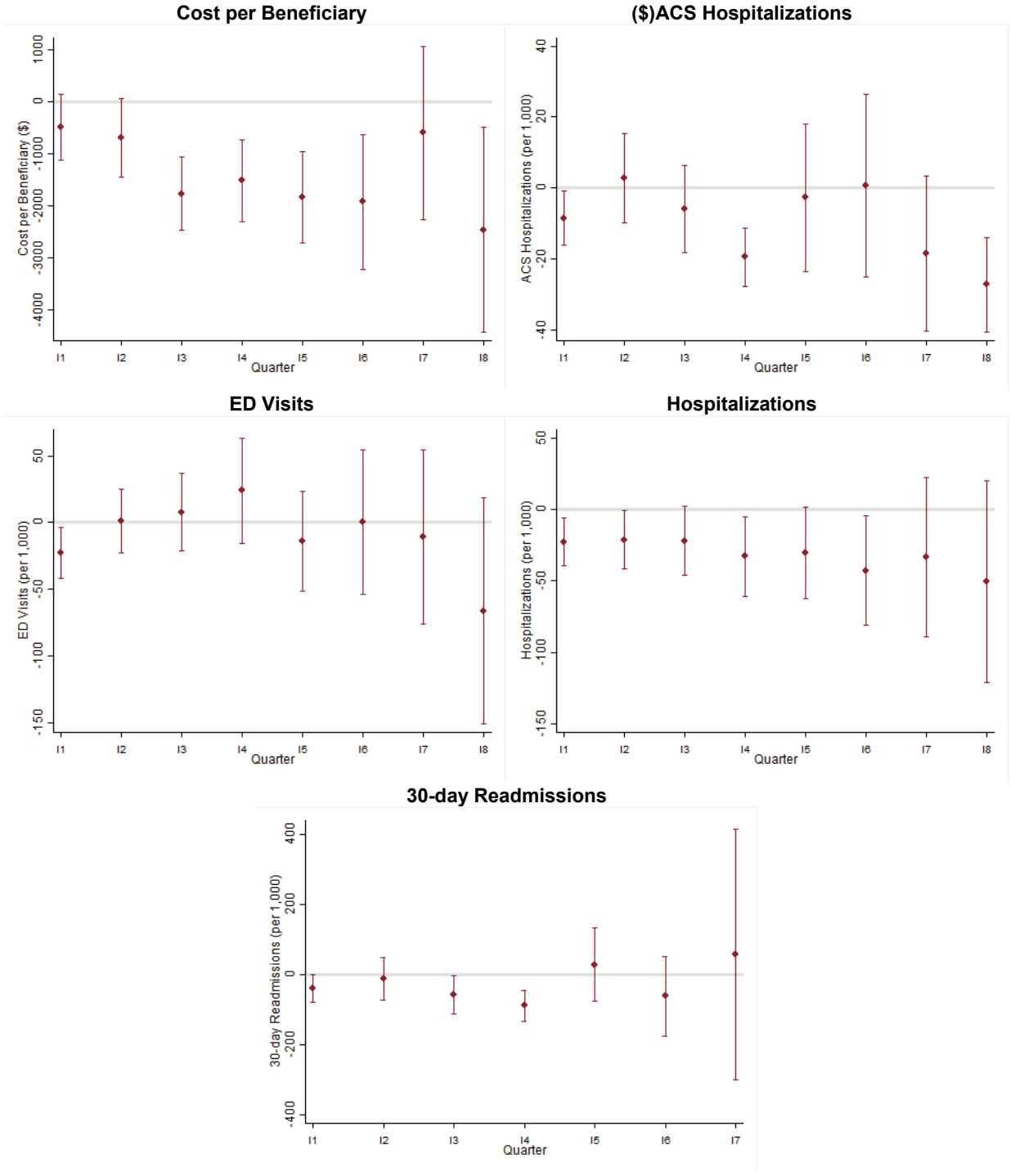
Exhibit D.BSLTOC.3: Common Support and Covariate Balance for BSLTOC and Comparison Group Participants, AL Analysis



Impact of BSLTOC Program in Each Quarter of Enrollment, AL Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.BSLTOC.4 displays the results of the quarterly fixed effects DID models.[410]

[410] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I8) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.BSLTOC.4: Impact of the BSLTOC Program on Outcomes by Quarter, AL Analysis

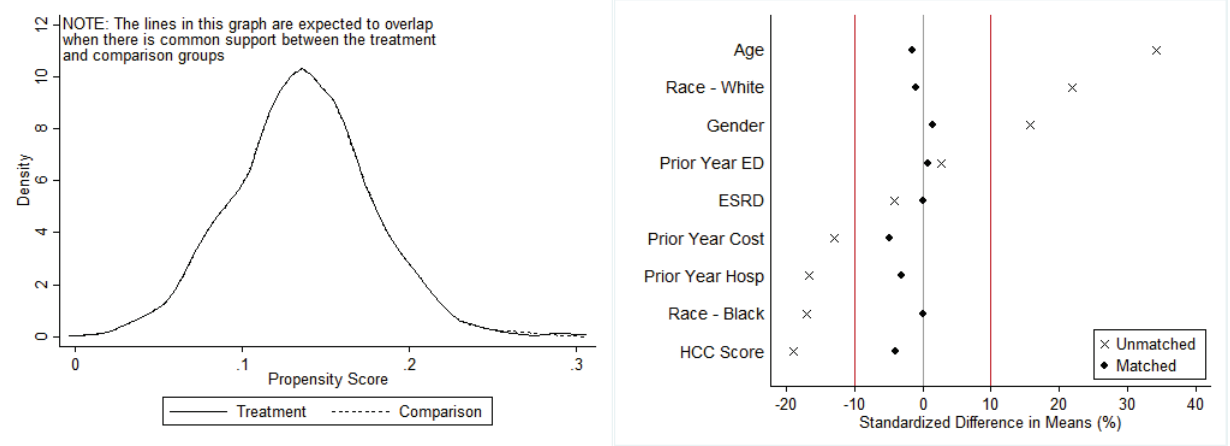


End-of-life (EOL) Analysis

Exhibit D.BSLTOC.5 presents common support and covariate balance across BSLTOC Program treatment and comparison group beneficiaries for the EOL analysis.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between BSLTOC participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.BSLTOC.5: Common Support and Covariate Balance for BSLTOC and Comparison Participants, EOL Analysis

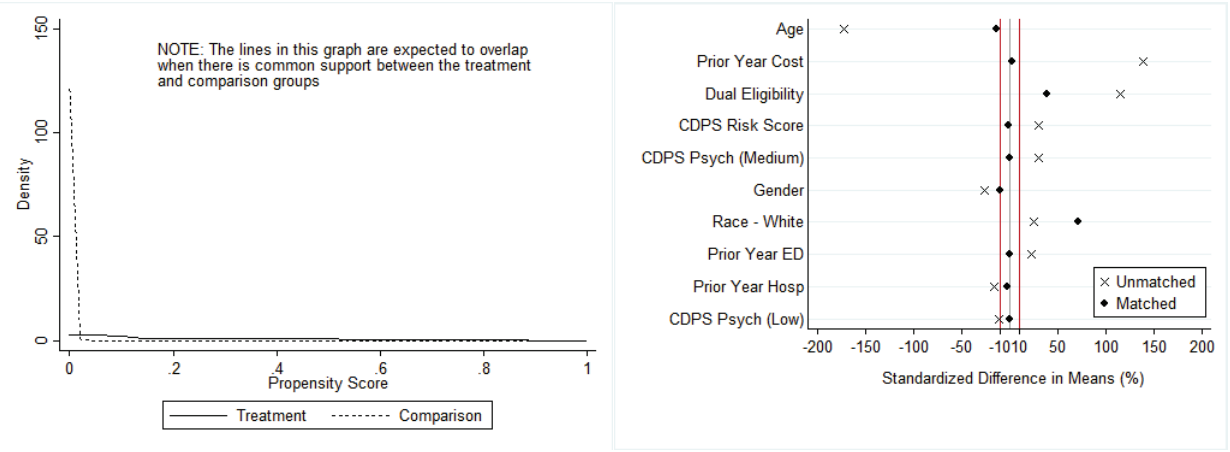


University of Rhode Island

Exhibit D.RIte.1 presents common support and covariate balance across Living RIte treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between Living RIte participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph). Although we were not able to achieve balance on the dual eligibility or race indicators, overall, the chart indicates that propensity score matching greatly improved the comparability of the treatment and comparison group.

Exhibit D.RIte.1: Common Support and Covariate Balance for Living RIte and Comparison Participants



Impact of Living RIte Program in Each Quarter of Enrollment. Findings from the quarterly fixed effects DID models of impact in each intervention departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

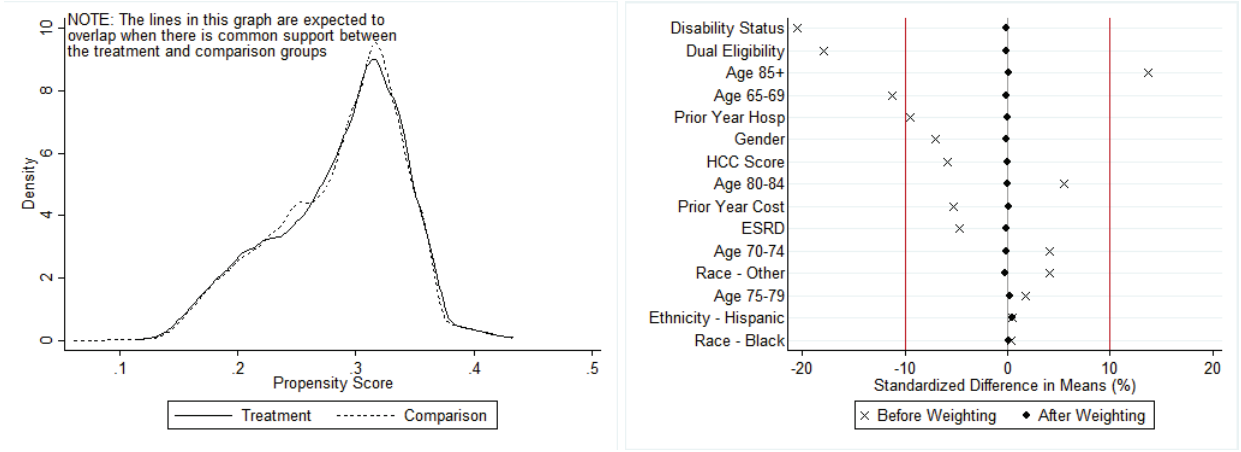
Vanderbilt University Medical Center

VUMC Post-Acute Care Analysis

Exhibit D.VUMC.1 presents common support and covariate balance across IMPACT-INTERACT post-acute care program treatment and comparison group beneficiary-episodes.

- After SMR weighting, we observe a high level of overlap in the distribution of estimated propensity scores across IMPACT-INTERACT and comparison group beneficiary-episodes (left graph).
- On the balance graphs, we show that weighting has achieved balance (i.e., reduced the difference between IMPACT-INTERACT and comparison group beneficiary-episodes to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

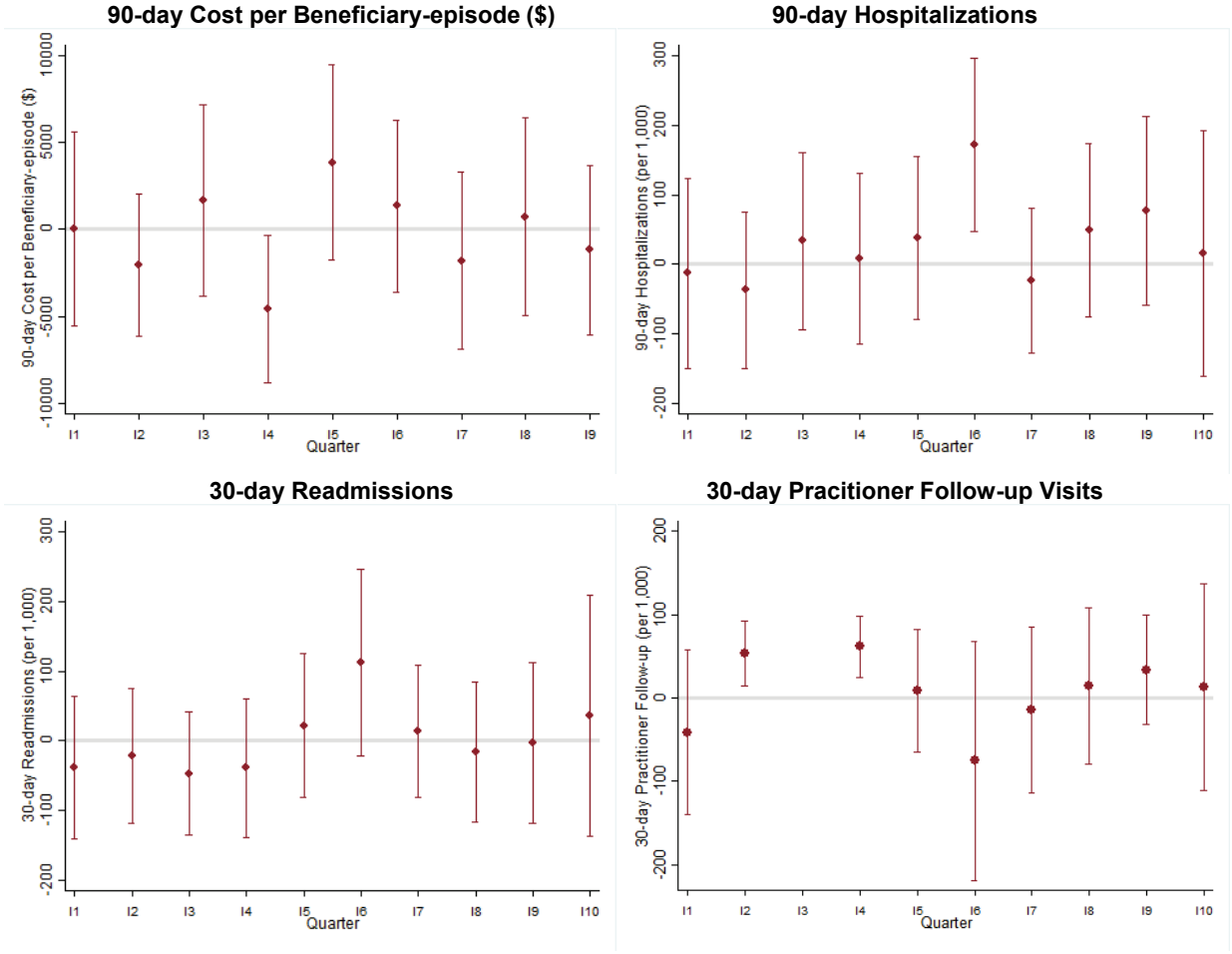
Exhibit D.VUMC.1: Common Support and Covariate Balance for IMPACT-INTERACT and Comparison Beneficiary-Episodes, Post-Acute Care Analysis



Impact of IMPACT-INTERACT Program in Each Quarter of Enrollment, Post-Acute Care Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter for total cost of care, hospitalizations, readmissions, and practitioner follow-up are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.VUMC.2 displays the results of the quarterly fixed effects DID models.[411] Findings from the QFE models for ED visits departed from the quarterly and aggregate results, and thus we present and discuss them in the awardee chapter.

[411] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiary-episodes (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I10) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary-episode. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.VUMC.2: Impact of the IMPACT-INTERACT Program on Outcomes by Quarter, Post-Acute Care Analysis[412]



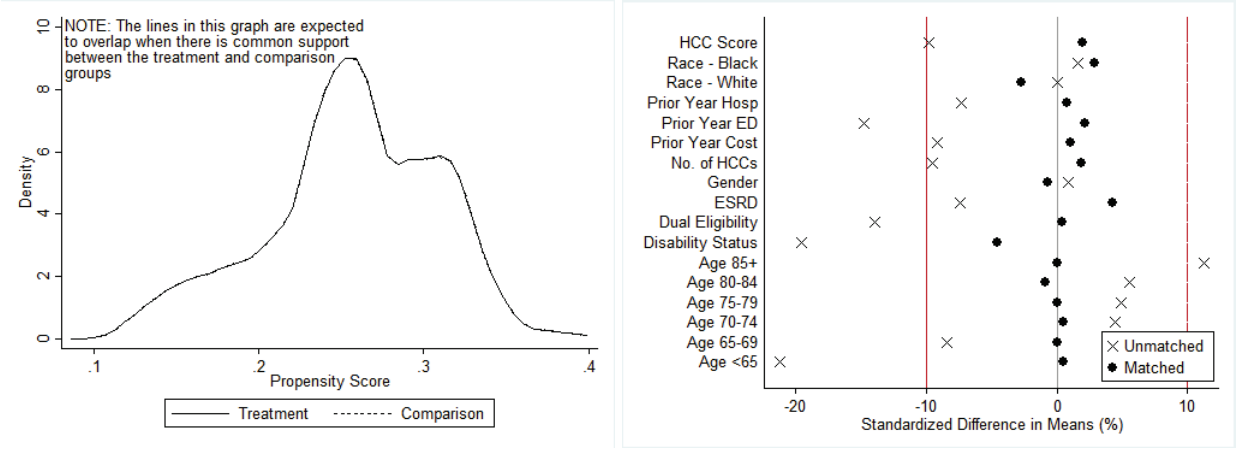
Community Analysis

Exhibits D.VUMC.3 presents common support and covariate balance across IMPACT-INTERACT community treatment and comparison group beneficiaries.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between IMPACT-INTERACT participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and cost (right graph).

[412] We are unable to calculate an adjusted difference for quarter I3 of the 30-day practitioner follow-up measure because all beneficiary-episodes in the IMPACT-INTERACT program had 30-day practitioner follow-up.

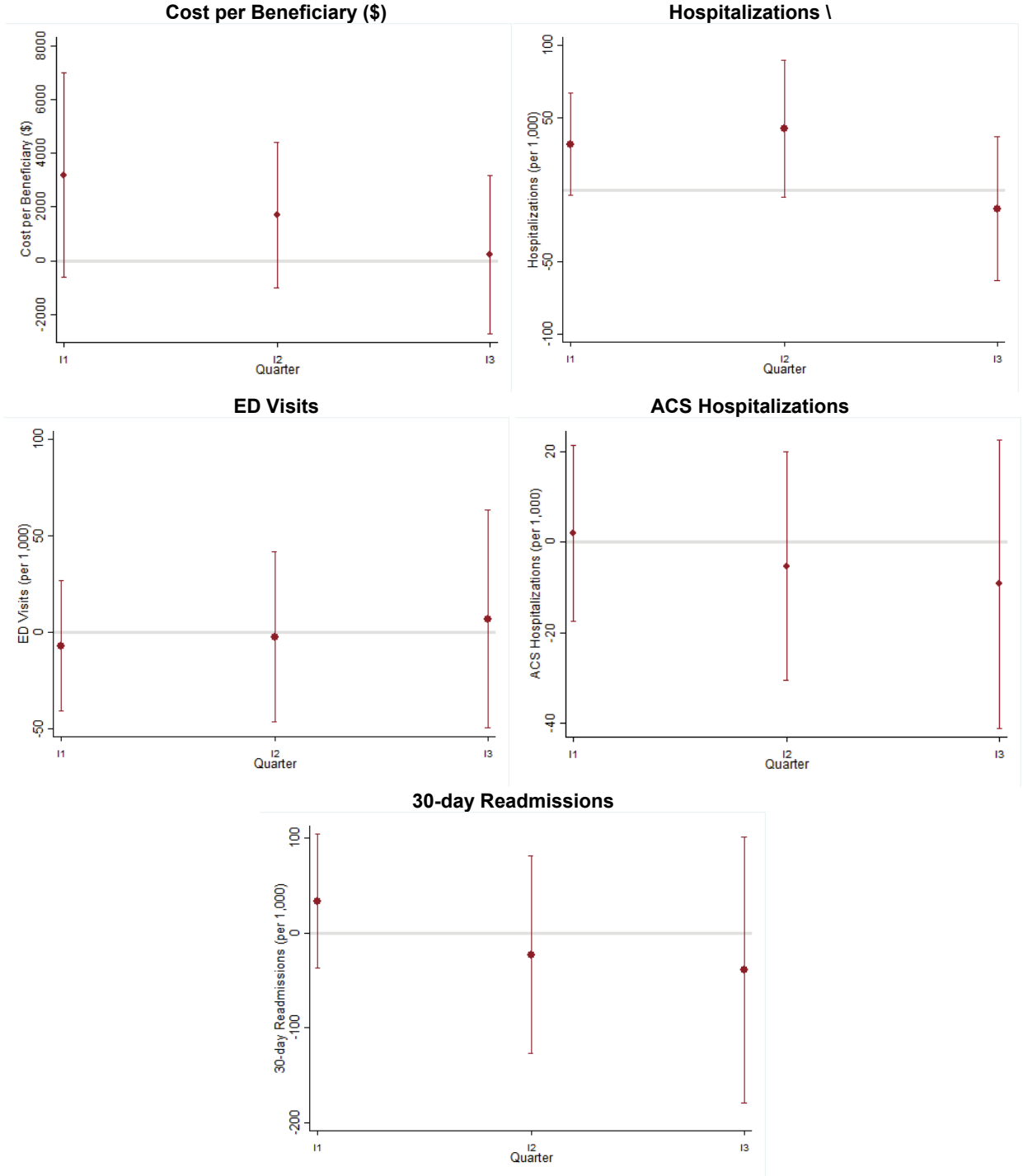
Exhibit D.VUMC.3: Common Support and Covariate Balance for IMPACT-INTERACT and Comparison Group Participants, Community Analysis



Impact of IMPACT-INTERACT Program in Each Quarter of Enrollment, Community Analysis. Findings from quarterly fixed effects DID models of impact in each intervention quarter are consistent with the average quarterly impacts summarized in the awardee chapter. Exhibit D.VUMC.4 displays the results of the quarterly fixed effects DID models.[413]

[413] For utilization and quality of care measures, the effect is displayed as the average difference between treatment and comparison, per 1,000 beneficiaries (and 90 percent confidence interval) for each quarter during the post-intervention (I1—I3) period, after adjusting for pre-intervention differences between the two groups. For total cost of care, this effect is displayed per beneficiary. See Appendix C for a more detailed explanation of the QFE DID models and measure specification.

Exhibit D.VUMC.4: Impact of the IMPACT-INTERACT Program on Outcomes by Quarter, Community Analysis

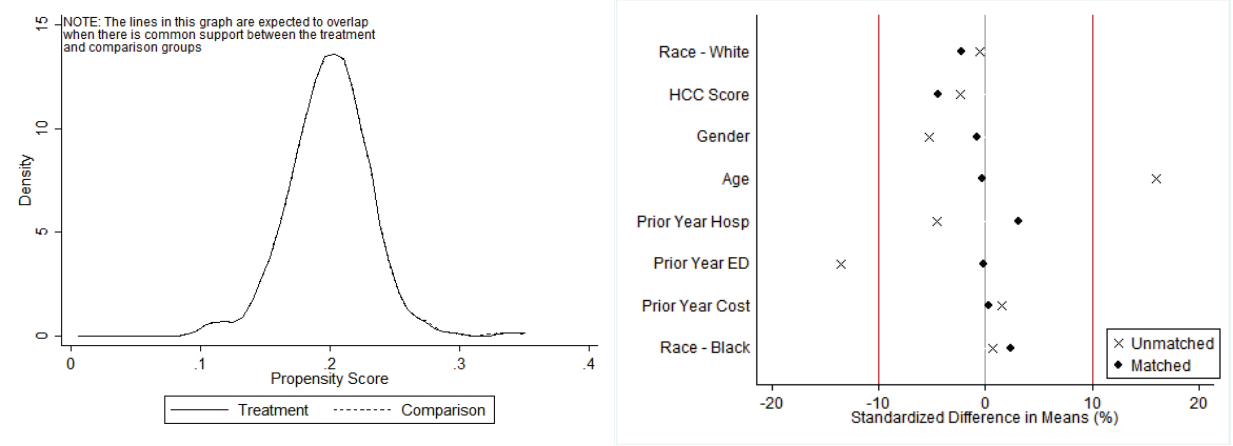


End-of-life (EOL) Analysis

Exhibit D.VUMC.5 presents common support and covariate balance across IMPACT-INTERACT Program treatment and comparison group beneficiaries for the EOL analysis.

- After matching, we observe a high level of overlap in the distribution of estimated propensity scores across treatment and comparison groups (left graph). The distributions suggest a favorable match between these groups with respect to the included factors.
- On the balance graph, we show that matching has achieved balance (i.e., reduced the difference between IMPACT-INTERACT participants and the comparison group to <10% standardized bias) with respect to demographic characteristics, comorbidities, and prior-year utilization and costs (right graph).

Exhibit D.VUMC.5: Common Support and Covariate Balance for IMPACT-INTERACT and Comparison Participants, EOL Analysis



Appendix E: Methods, Surveys

This appendix offers an update on survey data collection and analyses since NORC's second annual report to CMMI, covering the time period from June 2015 through June 2016.

The specific approach to survey data collection varies by awardee. In some cases, we have designed and administered our own survey; for other awardees NORC has collaborated in the design and fielding of an awardee's own survey; and for the remaining awardees, NORC has asked to receive raw survey data rather than contributing to the design or fielding a survey directly. Exhibit E.1 lists the survey domains. For sites where a small number of staff has been trained (making survey methods unreliable), we have used 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 E.1: 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

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, the creation and piloting of survey questions (where NORC was coordinating with ongoing work) or of survey instruments, and the administration of the surveys themselves. Further details about surveys are available in the awardee-specific chapters, the appendix of survey findings (Appendix F), or in previous NORC reports to CMMI.

Survey Data Cleaning and Analysis Summary. For the awardee surveys analyzed to date, 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 or SAS. 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. 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.

All survey data collection and analysis is complete. Since NORC's second annual report, data collection ended and/or analyses were conducted on many consumer surveys, including CLTCEC, DDHS, JCHiP, JHU-SON, LifeLong, Northland, PCCSB, SCRF, Sutter, Iowa, UNM, and UEMS, as well as on several workforce surveys, including CLTCEC, JCHiP, SCRF, and UAMS. This report includes many findings from these surveys Complete survey findings discussed in our Q8 and Q9 reports (those reports completed after our second annual report) are included in Appendix F, while select survey findings from these reports are integrated into individual awardee AR3 chapters when they provided additional context for our analyses or discussions.

Appendix F: Survey Analyses: Supporting Exhibits

Overview

NORC includes survey findings on consumer and caregiver experience, as well as the experience of project staff trained as part of HCIA 1 innovations (workforce trainees), as part of our evaluation. Surveys have been either developed by NORC staff, or designed and administered by an awardee, some with the inclusion of NORC-provided questions. Our overall approach to survey data is described in the introduction and methods chapter earlier in this report and details about survey methods reviewed in Appendix E.

Analysis and presentation of findings for surveys has proceeded in waves over time, with the first group of findings included in NORC's Second Annual Report to CMMI (2016), This Appendix includes findings for all survey analyses conducted since preparation of the Second Annual Report, including updates to previously reported findings; see Exhibit F.1 for a summary list of survey analyses by awardee and by report.

Exhibit F.1: Survey Analyses, by Awardee

Awardee	Consumer/Caregiver Experience		Workforce Trainee Experience	
	Type of Survey	Presented in AR2?	Type of Survey	Presented in AR2?
CLTCEC	awardee	no	awardee	no
CCNC	awardee	yes	awardee	yes
CKRI	NORC	yes	n/a	
DDHS	awardee w/NORC questions	demographics only	n/a	
J-CHiP	awardee w/NORC questions	no	awardee	no
JHU SON	NORC	no	n/a	
LifeLong	NORC	no	n/a	
Northland	NORC	demographics only	n/a	
PCCSB	NORC	no	n/a	
PRHI	n/a		NORC	yes
PPMC	n/a		NORC	yes
SCRF	awardee, NORC	no	NORC	no
Sutter Health	awardee	no	NORC	yes
UEMS	awardee	no	NORC	yes
UAMS	n/a		NORC	partial
U Iowa	awardee	no	n/a	
U New Mexico	awardee	partial	awardee	partial

California Long-Term Care Education Center

CLTCEC shared pre- and post-training data from the awardee's revised 2014 and 2015 consumer and workforce trainee surveys designed and analyzed by their external evaluator, the University of California, San Francisco School of Nursing (UCSF). The surveys correspond to the redesign of the HCIA-funded Care Team Integration training curriculum and provide a more accurate reflection of the current training

program, compared with earlier versions of both consumer and workforce trainee surveys fielded by UCSF.

Data Analysis. NORC received the 2014 and 2015 CLTCEC survey data in November and April 2015, respectively. Findings showed little change between 2014 and 2015 data and for this reason, we combined the data for analysis. While the surveys did not use a formal pre/post design (e.g., there were separate versions of both consumer and workforce trainee surveys fielded at the start and close of each cycle of training), items on both consumer and workforce trainee surveys enable respondents to describe changes during the time period in which the training takes place, allowing analysis that compares responses from baseline with those at post-training follow-up. For this reason, in our analysis, we refer to the data in terms of pre- and post-training. Our analysis of the full 2014 and 2015 pre- and post-training data is consistent with the findings from the UCSF team as presented in CLTCEC's quarterly reports to CMMI.

Key findings from our report focus primarily on differences in responses between the pre- and post-training surveys, for both IHSS consumers and IHSS providers (direct care worker trainees). In order to conduct statistical analyses, respondent pre-survey data were matched to post-survey data using a unique identifier provided by UCSF. Any unmatched pre- or post-survey data were excluded from our analytic file. Data were reviewed for completeness and to identify missing, invalid, skip logic errors, or out-of-range values. Response options of "Don't Know" (where applicable) were excluded from data tables due to low frequency. Unless otherwise noted, each survey item contains less than 5 percent non-response. Where variation in response patterns pointed to a potential statistically significant difference between the pre- and post- data, we perform t-tests and report the results in the discussion below. To run the statistical tests on the pre- and post- responses, categorical survey items were dummy-coded into dichotomous variables formed by grouping together the 'positive' and 'negative/neutral' responses for the survey question. Details of group construction for individual items are included in the discussion below.

Survey of Consumer Experience

The consumer surveys support CLTCEC in monitoring the impact of the Care Team Integration training on an in-home support services (IHSS) provider's integration and involvement in a consumer's care team, as well as the care they deliver to consumers. From 2014-2015, 2,618 consumers completed the pre-training consumer survey and 3,063 completed the post-training consumer survey. After excluding observations with unmatched pre- and post-survey data, 1,300 respondents with pre-post matched data were included in this analysis.

Demographic Background. As shown in Exhibit F.CLTCEC.1, roughly two-thirds (67 percent) of respondents are female, and almost half are age 75 or older (46 percent). The sample shows a diverse racial/ethnic makeup, representative of CLTCEC's target population: 31 percent of respondents identify as Asian, 27 percent identify as White, those who identify as Black or African American comprise 15 percent of the sample, and 24 percent report an "other" race. Thirty-eight (38) percent of respondents identify as Hispanic or Latino. English and/or Spanish are the main language(s) spoken by respondents, with an additional 13 percent reporting Korean as a main language. Fifty-six (56) percent of respondents do not live alone, and a majority of these respondents (85 percent) live with family members. The post-training findings show very few respondents (12 percent) indicated their living situation changed since completing the pre-training survey.

Exhibit F.CLTCEC.1: IHSS Consumer Survey: Demographic Characteristics, Respondents

Variable	Respondents % (N)
Number of Respondents	1,300
Gender [1 4] (N=1,172)	
Female	66.8 (783)
Age Group [1] (N=1,097)	
30-54 years	12.0 (132)
55-64 years	18.7 (205)
65-74 years	17.7 (194)
≥75 years	46.4 (509)
Race[1] (N=1,118)	
White	27.2 (304)
Black or African American	15.1 (169)
American Indian or Alaska Native	1.7 (19)
Asian	31.4 (351)
Native Hawaiian or Other Pacific Islander	0.8 (9)
Other	23.8 (266)
Hispanic or Latino[1] (N=1,122)	
Yes	38.0 (426)
Main Language(s) [1 2 4] (N=1,145)	
English	42.0 (481)
Spanish	33.4 (383)
Korean	12.8 (147)
Cantonese	8.8 (101)
Mandarin	7.9 (91)
Tagalog or other Filipino dialect	1.1 (13)
Vietnamese	0.3 (4)
Armenian	7.4 (85)
Other	2.4 (27)
Same primary language as main IHSS provider[1] (N=1,119)	
Yes	95.7 (1,071)
Live Alone[1] (N=1,122)	
Yes	43.8 (491)
No	56.2 (631)
Live with family members[3] (N=631)	
Yes	85.4 (539)

NOTES: [1]Missing/null records comprise greater than 5 percent of the overall data; missing/null records are dropped from the denominator when computing percentages. [2]Respondents could choose up to two main languages. [3]Only asked of respondents who reported not living alone (n=631). [4]Based on pre-training survey responses.

Relationship with IHSS Provider. Most respondents (94 percent) reported working with the same main IHSS provider before and after the training, with little change in the number of providers working for and living with respondents, as shown in Exhibits F.CLTCEC.2 and F.CLTCEC.3. Most consumers (95 percent pre-survey, 93 percent post-survey) work with one IHSS provider, roughly 40 percent have one IHSS provider living with them, and more than half (57 percent) report at least one provider that is a family member. At the beginning of the training, 20 percent of respondents had worked with their main IHSS provider for less than a year, 29 percent worked with their main provider for 1-3 years and an additional 25 percent worked with their provider for 3-6 years. On average, respondents in the analysis

are approved for 78 IHSS hours per month, lower than the average 82 hours approved for the consumer survey sample as a whole (including unmatched observations). Sixty-four (64) percent of respondents report instruct their main IHSS provider "always" (33 percent) or "often" (31 percent), and most (91 percent) report that their provider listens to them (68 percent "always" and 23 percent "often").

Exhibit F.CLTCEC.2: IHSS Consumer Survey; Relationship with IHSS Provider, Pre- and Post-Training

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
IHSS providers currently working for you[1] (N=1,241)			
One	94.6 (1,174)	92.8 (1,152)	↓ decrease
Two	3.1 (39)	4.1 (51)	↑ increase
Three	0.9 (11)	1.0 (13)	↑ increase
Four or More	1.4 (17)	2.0 (25)	↑ increase
IHSS providers living with you[1] (N=1,164)			
None	59.0 (687)	56.9 (662)	↓ decrease
One	38.7 (450)	40.3 (469)	↑ increase
Two	1.1 (13)	1.2 (14)	↑ increase
Three	0.6 (7)	0.8 (9)	↑ increase
Four or More	0.6 (7)	0.9 (10)	↑ increase
IHSS providers are family members[1] (N=1,123)			
None	43.5 (489)	43.3 (486)	↓ decrease
One	51.9 (583)	50.6 (568)	↓ decrease
Two	2.0 (22)	3.1 (35)	↑ increase
Three	1.2 (13)	1.5 (17)	↑ increase
Four or More	1.4 (16)	1.5 (17)	↑ increase

NOTE: [1]Incomplete paired data (i.e. a null pre or post response) are excluded from estimation of frequencies.

Exhibit F.CLTCEC.3: IHSS Consumer Survey: Relationship with IHSS Provider, Pre-Training

Variable	Respondents % (N)
How long has main provider worked for you [1 2] (N=1,227)	
Under 1 year	19.7 (242)
1-3 years	28.5 (350)
3-6 years	24.6 (302)
6-9 years	12.7 (156)
More than 9 years	14.4 (177)
Tell main IHSS provider what to help you with[1 2] (N=1,231)	
Always	32.8 (404)
Often	30.7 (378)
Sometimes	19.4 (239)
Rarely	10.6 (131)
Never	6.4 (79)
Main IHSS provider listens to what you tell him or her to do[1 2] (N=1,205)	
Always	67.7 (816)
Often	22.5 (271)
Sometimes	6.1 (73)

Variable	Respondents % (N)
Rarely	1.7 (21)
Never	2.0 (24)

NOTES: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records are dropped from the denominator when computing percentages. [2]Only asked on pre-training consumer survey.

Integration into Care Team. A main objective of the CLTCEC training is to integrate IHSS providers into the healthcare system, which may help the provider better communicate changes in their consumer's health and more easily monitor their consumer's health. Exhibit F.CLTCEC.4 displays findings for ten items related to this objective. Most respondents "agree" or "strongly agree" that IHSS providers should be part of healthcare teams (94 percent pre-survey, 95 percent post-survey). There is little change between pre- and post-survey responses in terms of frequency of communication with a consumer's care team regarding health conditions and well-being, while a majority of consumers had a positive outlook on provider/care team integration after the training. Eighty-seven (87) percent of respondents think their provider will be able to better communicate with their care team, while less than 1 percent expect that communication will be worse. Almost all consumers (97 percent) are "very confident" or "confident" their provider will be an effective member of their healthcare team, and 71 percent think their provider will communicate with their care team more often.

At the beginning of training, most respondents (70 percent) report having information on whom to contact for health concerns, which may include a case manager or advice nurse, and 80 percent report obtaining contact information during the training. Most communication between a respondent's main IHSS provider and his/her healthcare team continues to be either by phone or in-person, with a doctor being the main care team member with whom an IHSS provider communicates most often (78 percent pre-survey, 82 percent post-survey). Post-training, there was a statistically significant decrease ($p<0.01$) in the number of respondents who reported their IHSS provider did not communicate with their healthcare team (68 percent pre-survey, 2 percent post-survey), and an additional 477 respondents who reported at least some communication in the past month (even if they did not know how many times they had communicated with the healthcare team).[414] Both pre- and post-training data show the main reasons for communication include discussing medical equipment (e.g. wheelchair), reporting or discussing blood sugar levels, and asking for medication refills. While the training may have influenced an increase in communication, other factors could have also contributed to the change, including but not limited to, the timing of survey administration (e.g. communication may happen at set intervals, such as bi-monthly check-ins or when a consumer visits his or her primary care provider).

Exhibit F.CLTCEC.4: IHSS Consumer Survey: IHSS Providers and Healthcare Teams

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
IHSS providers should be part of healthcare teams[6] (N=1,135)			
Strongly Agree/Agree	94.3 (1,070)	95.0 (1,078)	↑ increase
Neither agree nor disagree/Disagree/Strongly Disagree	5.7 (65)	5.0 (57)	↓ decrease

[414] The number of respondents (N=477) represents the difference between the post-survey value of 638 respondents noting some communication in the past month, compared with the pre-survey value of 161 respondents with some communication in the past month.

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
How often does main IHSS provider communicate with anyone from your healthcare team about your health conditions[6] (N=1,100)			
Always/Often/Sometimes	87.0 (957)	84.8 (933)	↓ decrease
Rarely/Never	13.0 (143)	15.2 (167)	↑ increase
How often does main IHSS provider communicate with anyone from your healthcare team about your well-being[6] (N=1,085)			
Always/Often/Sometimes	83.6 (907)	85.5(928)	↑ increase
Rarely/Never	16.4 (178)	14.5 (157)	↓ decrease
Usual way main IHSS provider communicates with healthcare team [2 6] (N=1,075)			
Phone	32.0 (344)	37.4 (402)	↑ increase
Email	0.7 (8)	1.4 (15)	↑ increase
In-person	58.1 (625)	53.2 (572)	↓ decrease
Website	--	2.3 (25)	--
Other	4.3 (46)	1.3 (14)	↓ decrease
Person from healthcare team main IHSS provider communicates with most often [2 3 6] (N=897)			
Doctor	77.9 (699)	81.9 (735)	↑ increase
Nurse	39.0 (350)	37.0 (332)	↓ decrease
Social Worker	33.8 (303)	34.3 (308)	↑ increase
Doctor's Office staff	27.5 (247)	32.0 (287)	↑ increase
Pharmacist	44.6 (400)	41.4 (371)	↓ decrease
Times in the past month main IHSS provider communicated with anyone from healthcare team [6] (N=894)			
Mean number of times[5]	3.4 (38)	3.5 (466)	↑ increase
Don't know how many times	13.8 (123)	19.2 (172)	↑ increase
IHSS provider did not communicate with healthcare team this past month	67.5 (603)	1.8 (16)	↓ decrease*
Prior to training, did you or your main IHSS provider have information on who to contact for health concerns [1 4] (N=1,205)			
Yes	--	69.7 (840)	--
Now that your main IHSS provider has completed this training, do you think he/she will communicate with your healthcare team more often, less often or the same [1 4] (N=1,169)			
More often	--	71.0 (830)	--
Less often	--	3.5 (41)	--
About the same	--	21.6 (252)	--
Now that your main IHSS provider has completed this training, do you think he/she will communicate better, the same, or worse with your healthcare team [1 4] (N=1,182)			
Better	--	86.6 (1,024)	--
The same	--	10.7 (126)	--
Worse	--	0.2 (2)	--
Now that your main IHSS provider has completed this training, how confident do you feel that he/she will be an effective member of your healthcare team [1 4] (N=1,173)			
Very confident	--	73.8 (866)	--
Confident	--	23.2 (272)	--
Somewhat confident	--	2.5 (29)	--
Not at all confident	--	0.5 (6)	--

NOTES: Responses of Don't Know/Refused/Not Applicable have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100 percent.[1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records are dropped from the denominator when computing percentages. [2] Respondents could select more than one answer. [3] Top five most common responses presented. [4]Only asked on post-training consumer survey. [5]Mean based on number of valid responses, 130 pre-survey records and 240 post-survey records excluded due to invalid or out of range response. [6]Incomplete paired data (i.e. a null pre or post response) are excluded from estimated frequency.
*T-test performed on collapsed responses of "IHSS provider did not communicate with healthcare team" versus "Did Communicate/Don't know how many times."

Health Status. Exhibit F.CLTCEC.5 presents summary findings related to the health and functioning of IHSS consumer respondents. There is a significant increase in the proportion of respondents reporting excellent, very good, or good health after the training, compared with pre-training responses (22 percent

v. 43 percent, p<0.01). Supporting this finding, there is a statistically significant decline between pre- and post-training surveys in the percentage of consumers who expressed feeling sad or depressed "all of the time" (p<0.01). Post training, a higher percentage of respondents did not report any ER visits (67 percent pre-survey, 70 percent post-survey) or hospitalizations (79 percent pre-survey, 84 percent post-survey) in the past four months, although there is a slight increase in the number of respondents reporting 3 or more ER visits, as well as those reporting 3-4 hospitalizations, in the four months prior to the survey.

Exhibit F.CLTCEC.5: IHSS Consumer Survey: Health Status, Respondents

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
General Health[2] (N=1,048)			
Excellent/Very Good/Good	22.4 (235)	42.7 (447)	↑ increase*
Fair/Poor	77.6 (813)	56.8 (595)	↓ decrease
How often did you feel sad or depressed[2] (N=941)			
All of the time	13.8 (130)	10.5 (99)	↓ decrease*
Some of the time	38.3 (360)	32.7 (308)	↓ decrease
A little of the time	22.3 (210)	24.4 (230)	↑ increase
None of the time	25.6 (241)	32.3 (304)	↑ increase
Number of ER visits in the past 4 months [2] (N=942)			
None	67.2 (633)	69.6 (656)	↑ increase
1-2	26.8 (252)	21.7 (204)	↓ decrease
3-4	5.3 (50)	7.5 (71)	↑ increase
5 or more	0.7 (7)	1.2 (11)	↑ increase
Hospitalizations in the past 4 months[2] (N=937)			
None	79.3 (743)	84.3 (790)	↑ increase
1-2	18.6 (174)	12.4 (116)	↓ decrease
3-4	1.6 (15)	2.9 (27)	↑ increase
5 or more	0.5 (5)	0.4 (4)	↓ decrease

NOTES: 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 percent.[1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages.[2]Incomplete paired data (i.e. a null pre or post response) excluded from frequency.
*T-test performed on collapsed responses of "Excellent/Very Good/Good" versus "Fair/Poor" and "All of the time" versus "Some/a little/none of the time."

Survey of Workforce Trainee Experience

Our initial analysis of CLTCEC workforce surveys, presented in NORC's Second Annual Report to CMMI (2016) is updated below. The workforce surveys are designed to capture the experiences of IHSS providers (direct care workers) with the HCIA-supported Care Team Integration training, measuring trainee satisfaction and perceived effectiveness of the training in improving home care skills and facilitating integration into the consumer's healthcare team. Pre- and post-training surveys were administered to IHSS providers at the beginning and end of Care Team Integration training. Between 2014 and 2015, a total of 6,090 providers participated in the pre-training workforce survey, and 6,393 participated in the post-training workforce survey. There are 4,561 pre-post matched observations (i.e., respondents) included in this analysis.

Demographic Background. As shown in Exhibit F.CLTCEC.6, most respondents (90 percent) are female, age 30-64 years (83 percent). Thirty-six (36) percent identify as White, 20 percent identify as Asian, and an additional 32 percent identify as an "other" race. Roughly half of the respondents (51 percent) are Hispanic or Latino. Similar to the consumer survey findings, most respondents speak English (50 percent) and/or Spanish (49 percent), with an additional 17 percent speaking Armenian as a main language. A quarter (25 percent) of respondents have earned an advanced degree or technical certificate, 17 percent are high school graduates, and 41 percent have not completed high school. Of those providing an annual household income (n=3,771), 71 percent earn less than $30,000, with only 10 percent earning $50,000 or more.

Exhibit F.CLTCEC.6: IHSS Provider Survey: Demographic Characteristics, Respondents

Variable	Respondents % (N)
Number of Respondents	4,561
Gender [1] (N=4,131)	
Female	89.4 (3,695)
Age Group [1] (N=3,913)	
Less than 30	4.9 (191)
30-54 years	50.9 (1,992)
55-64 years	32.4 (1,269)
65-74 years	7.4 (288)
≥75 years	1.2 (45)
Race [1] (N=3,760)	
White	36.2 (1,362)
Black or African American	10.3 (386)
American Indian or Alaska Native	0.7 (27)
Asian	20.3 (762)
Native Hawaiian or Other Pacific Islander	0.6 (21)
Other	32.0 (1,202)
Hispanic or Latino [1] (N=4,114)	
Yes	50.8 (2,091)
Main Language(s) [1] (N=4,164)	
English	50.0 (2,080)
Spanish	48.5 (2,021)
Korean	8.1 (338)
Cantonese	5.0 (209)
Mandarin	6.0 (248)
Tagalog or other Filipino dialect	0.9 (38)
Vietnamese	0.2 (9)
Armenian	16.7 (697)
Other	3.5 (145)
Highest level of Education	
None	2.3 (105)
8th grade or less	16.8 (764)
Some high school (grades 9, 10, 11 and 12)	22.2 (1,012)
High school graduate (or G.E.D. certificate)	17.0 (774)
Some college, no degree	14.5 (662)
Technical or trade/vocational school certificate	8.3 (378)
Associate's degree	5.7 (262)
Bachelor's degree	6.3 (286)
More than 4-years of college	4.9 (224)
Total people in Household	
Mean (N)	4 (4,092)
Total household's yearly income [1] (N=3,771)	
Less than 10,000	16.1 (607)
$10,000-$19,999	29.4 (1,109)
$20,000-$29,999	25.2 (949)
$30,000-$39,999	12.3 (464)
$40,000 - $49,999	7.3 (275)
$50,000 - $59,999	3.8 (145)
$60,000 - $69,999	2.7 (101)
$70,000 - $79,999	1.1 (41)
$80,000 - $89,999	1.2 (46)
$90,000 - $99,999	0.3 (10)
$100,000 or more	0.6 (24)

NOTES: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages.

Work Background and Employment, Before Training. Exhibit F.CLTCEC.7 presents the prior training and employment profile of providers at the beginning of the HCIA-supported training. Nearly all respondents (99 percent) who completed the survey are currently employed as a caregiver, with most (88 percent) in Los Angeles County. Most have been working as an IHSS provider for more than two years (74 percent), with someone who is 65 years or older (63 percent), and care for a family member (65 percent); of those providers caring for a family member, 67 percent live in the same residence as their family member. Thirty-two (32) percent of respondents report working more than 40 hours in the past month as an IHSS provider, and most earn $8.00-$12.20 per hour (97 percent). Thirty-four (34) percent had previous formal or informal training in the health or home care fields, including CPR (51 percent), home care training (46 percent), and First Aid (44 percent).

Exhibit F.CLTCEC.7: IHSS Provider Survey: Trainee Background and Employment (Pre-training)

Variable	Respondents % (N)
Number of respondents	**n=4,561**
Formal or Informal training in the health care or home care fields (before training)	
Yes	33.8 (1,543)
Currently employed as caregiver	
Yes	98.5 (4,491)
County currently employed in as an IHSS provider [2]	
Contra Costa	2.9 (132)
Los Angeles	88.4 (3,969)
San Bernardino	7.4 (333)
Average number of hours worked in the past month as an IHSS provider [2]	
10 or fewer	7.9 (356)
11-20 hours	19.6 (878)
21-30 hours	20.2 (909)
31-40 hours	18.1 (811)
Greater than 40 hours	31.9 (1,434)
Hourly Rate [1 2] (N=4,241)	
Less than $8.00	2.7 (116)
Between $8.00 - $12.20	96.5 (4,094)
More than $12.20	0.7 (31)
Number of people being paid to care for by the IHSS program (over the past month) [2]	
One	60.2 (2,703)
Two	25.0 (1,124)
Three	8.4 (379)
4 or more	3.0 (135)
Age of main client [2]	
Under 18 years old	0.5 (23)
18-64 years old	32.4 (1,456)
65+ years old	63.2 (2,840)
Being paid to care for a friend [1 2] (N=4,237)	
Yes	17.3 (731)
Do any of these persons live with you [1] (N=680)	
Yes	34.1 (232)
No	65.9 (448)
Being paid to care for a family member [1 2] (N=4,262)	
Yes	65.2 (2,778)
Do any of these persons live with you [1] (N=2,613)	
Yes	66.9 (1,748)
No	33.1 (865)
Working as an IHSS provider [2]	
Less than 3 months	2.2 (98)
3 months to 6 months	3.7 (164)
7 months to 12 months	5.8 (262)
1 year to 2 years (12 months to 24 months)	11.4 (512)
More than 2 years (more than 24 months)	74.1 (3,327)

NOTES: 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 percent. [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages. [2]Only asked of those currently employed as a caregiver (N=4,491).

Job Satisfaction. The survey asked respondents series of questions about their attitudes and engagement with their IHSS work in the pre-training survey; Exhibit F.CLTCEC.8 displays these measures. Across all measures, respondents report high levels of job satisfaction ("satisfied" or "very satisfied"). The highest ratings (satisfied or very satisfied) are for perceived contribution made to the care of the consumer(s),

accomplishment at the end of the day (84 percent), and quality of work and standard of care given to consumer(s) (both are 84 percent). The lowest ratings were for the amount of challenge associated with the job (75 percent), and the extent to which the job is varied and interesting (77 percent).

Exhibit F.CLTCEC.8: IHSS Provider Survey: Job Satisfaction (Pre-training)

Variable	Number of Respondents	Percent Satisfied or Very Satisfied % (N)
The feeling of worthwhile accomplishment I get from my work [1]	4,198	80.6 (3,382)
The extent to which I can use my skills [1]	3,973	79.8 (3,172)
The contribution I make to the care of the consumer(s) [1]	3,988	84.2 (3,356)
The amount of challenge in my job [1]	3,911	74.9 (2,931)
The extent to which my job is varied and interesting [1]	4,061	77.2 (3,134)
What I have accomplished when I am done at the end of the day [1]	3,967	84.1 (3,336)
The standard of care given to consumer(s) [1]	3,985	84.1 (3,351)
The amount of personal growth and development I get from my work [1]	4,095	78.1 (3,197)
The quality of my work with consumer(s) [1]	4,017	84.2 (3,384)
The amount of independent thought and action I can exercise in my work [1]	3,969	81.5 (3,234)
The amount of involvement with my consumer's healthcare team [1]	3,964	78.4 (3,106)

NOTE: [1]Missing/null records constitute greater than 5 percent of the overall data. Missing/null records have been dropped from the denominator when computing percentages.

Training Experience. Overall, respondents' evaluations of the training course and instructor are positive, as shown in Exhibit F.CLTCEC.9. Almost all IHSS providers (97 percent) are satisfied with the training overall and with various aspects of the training, as evidenced by the high proportions of respondents agreeing or strongly agreeing with the following statements:[415]

- The time of day the classes were held was convenient (95 percent)
- The instructor was well prepared (97 percent)
- The instructor explained the materials in an easy to understand way (94 percent)
- The participant guide materials were easy to understand (93 percent)

While evaluations were generally positive, a quarter of respondents reported not having enough time to learn the content covered in the training, and 15 percent were not able to understand what the instructor was saying.

[415] Percentage represent the number of respondents who "agree" or "strongly agree" with the statement.

Exhibit F.CLTCEC.9: IHSS Provider Survey: Training Course and Instructor (Post-training)

Variable	% (N)
Number of respondents (unless otherwise noted)	**N=4,561**
Overall, I am satisfied with the training	
Strongly Agree	83.3 (3,801)
Agree	14.1 (642)
The time of day the classes were held was convenient	
Strongly Agree	70.9 (3,233)
Agree	23.8 (1,087)
The instructor was well prepared	
Strongly Agree	86.8 (3,961)
Agree	10.1 (462)
The instructor was knowledgeable about the course material [1] (N=4,332)	
Strongly Agree	88.5 (3,832)
Agree	10.5 (454)
The instructor explained the materials in an easy to understand way	
Strongly Agree	83.4 (3,803)
Agree	10.3 (468)
The participant guide materials were easy to understand	
Strongly Agree	68.0 (3,100)
Agree	24.5 (1,116)
I did not have enough time to learn the content covered in this training [1] (N=4,182)	
Strongly Agree	14.1 (588)
Agree	10.7 (448)
Neither Agree nor Disagree	11.1 (464)
Disagree	34.4 (1,439)
Strongly Disagree	29.7 (1,243)
I was not able to understand what the instructor was saying [1] (N=4,191)	
Strongly Agree	10.6 (444)
Agree	4.8 (202)
Neither Agree nor Disagree	6.7 (282)
Disagree	29.8 (1,250)
Strongly Disagree	48.0 (2,013)

NOTE: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages.

Training Knowledge and Skills. At baseline, the top three expectations of providers were to learn more skills on how to care for IHSS consumers (82 percent), to be better able to help IHSS consumers (73 percent), and to be better informed about healthcare issues (72 percent) (findings from pre-survey, not presented). Exhibit F.CLTCEC.10 presents summary findings related to new knowledge and skills attributed to the training. After the training, respondents generally describe feeling more prepared and better able to perform their job as an IHSS provider. Almost all report an increase in knowledge of how to care for a person at home (96 percent); learning new skills (94 percent), in particular how to communicate with a consumer's care team (94 percent); and feeling better-prepared to perform their job (94 percent).

Exhibit F.CLTCEC.10: IHSS Provider Survey: Training Skills and Knowledge (Post-training)

Variable	Percent Agree or Strongly Agree % (N)
Number of Respondents (unless otherwise noted)	N=4,561
My knowledge about how to care for a person at home increased after taking this training course	95.9 (4,374)
I feel better-prepared to perform the job of an IHSS provider	94.3 (4,301)
I had enough time to practice the skills I learned during the training [1] (N=4,291)	96.0 (4,118)
The skills I learned during this training program will be useful in my work as an IHSS provider	95.6 (4,362)
I learned new skills in this training program	94.3 (4,300)
I have the skills I need to do a good job as an IHSS provider	94.1 (4,292)
I learned skills needed to communicate with my consumer's healthcare team	93.5 (4,264)

NOTE: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages.

Integration into Care Team. As mentioned above, a key component of the training is the integration of IHSS providers into a consumer's healthcare team. Exhibit F.CLTCEC.11 shows that about 60 percent of respondents report increased communication with a consumer's healthcare team since the training, and most (77 percent) would like to communicate with a healthcare team "always" or "often" in the future (as opposed to only 74 percent in the pre-test).

Responses on pre-training surveys differ between consumers and trainees (providers)—while 68 percent of *consumers* reported their main provider did not communicate with their healthcare team in the past month (see Exhibit F.CLTCEC.11), only 22 percent of *providers* did not report any communication. This discrepancy in reporting between consumers and providers may be related to lack of communication between the two groups of respondents, lack of awareness of healthcare team discussions on the part of the consumer, or over/under-reporting by the respondents. For providers, nevertheless, the percentage of respondents who did not report any healthcare team communication decreased to 19 percent in the post-training survey. Providers reported communicating with a consumer's healthcare team an average of five times at the beginning of training, and four times post-training, with the most common means of communication being by phone (56 percent pre-survey, 65 percent post-survey) or in-person (67 percent pre-survey, 69 percent post-survey). The variation in mean number of communications could be affected by the number of invalid responses presented in the data (e.g., responses such as "sometimes," "always," or counts given in ranges such as "1-20"). Mirroring consumer findings, providers report discussing a consumer's health and well-being, asking for medication refills, and scheduling appointments for their clients with other members of a consumer's healthcare team.

Exhibit F.CLTCEC.11: IHSS Provider Survey: Care Team Communication

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
Number of Respondents (unless otherwise noted)	**N=4,561**		
Compared to when you began this training course, how often are you now communicating with your consumer's healthcare team [1 6] (N=4,213)			
More than before training	--	59.3 (2,497)	

Variable	Respondents % (N) Pre Survey	Respondents % (N) Post Survey	Change from pre to post
Number of Respondents (unless otherwise noted)	N=4,561		
Same as before training	--	32.7 (1,379)	
Less than before training	--	8.0 (337)	
How many times in the past month did you communicate with your consumer's healthcare team? [5] (N=3,699)			
Mean number of times[4]	5.3 (1,949)	4.1 (2,166)	↓ decrease
Did not communicate with healthcare team this past month	22.2 (823)	18.7 (690)	↓ decrease
Usual way to communicate with healthcare team [2] [5] (N=2,485)			
Phone	55.7 (1,385)	65.3 (1,623)	↑ increase
Email	2.7 (68)	4.0 (99)	↑ increase
In-Person	67.4 (1,676)	68.5 (1,703)	↑ increase
Other	3.3 (81)	3.0 (74)	↓ decrease
What did you communicate about [2] [3] [5] (N=2,901)			
Made an appointment for consumer to see a health care provider	66.8 (1,939)	80.8 (2,344)	↑ increase
Asked for refills for consumer's medication	63.5 (1,843)	69.1 (2,006)	↑ increase
Reported or discussed consumer's health condition	47.1 (1,367)	51.3 (1,489)	↑ increase
Reported or discussed consumer's general well-being	35.2 (1,021)	39.6 (1,150)	↑ increase
Reported or discussed consumer's nutrition	33.5 (973)	41.1 (1,192)	↑ increase
In the future, how often do you want to communicate with your consumer's healthcare team? [5] (N=3,813)			
Always	41.0 (1,565)	44.5 (1,695)	↑ increase
Often	32.7 (1,245)	32.9 (1,253)	↑ increase
Sometimes	21.9 (834)	18.2 (695)	↓ decrease
Rarely	3.1 (119)	3.1 (118)	--
Never	1.3 (50)	1.4 (52)	↑ increase

NOTES: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records have been dropped from the denominator when computing percentages.[2] Respondents could select more than one answer. [3] Top five most common responses presented. [4]Mean based on number of valid responses, with 927 pre-survey records and 843 post-survey records excluded due to invalid or out of range response. [5]Incomplete paired data (i.e. a null pre or post response) have been excluded from frequency. [6]Only asked on post-training workforce survey.

Home Care as an Occupation. In the post-training survey, IHSS providers were asked to respond to several questions about their beliefs and intentions regarding the occupation of home caregiving; Exhibit F.CLTCEC.12 shows the results of these questions. Most respondents (83 percent) feel a sense of responsibility to their occupation in the home care field, with 82 percent expressing a belief that people who have been trained in home care should stay in the field, and an additional 74 percent feeling an obligation to remain in the occupation. A majority of respondents do not express intentions to leave their current job, and 57 percent report they would feel guilty if they did. Providers who report caring for a family member (65 percent, as reported in Exhibit F.CLTCEC.12) are twice as likely to feel an obligation and responsibility to remain in the home care field than those not caring for a family member (subgroup analysis, not reported in exhibits).

Exhibit F.CLTCEC.12: IHSS Provider Survey: Feelings and Intention, Home Care Occupation (Post-training)

Variable	Respondents % (N)
Number of Respondents (unless otherwise noted)	N=4,561
I believe that people who have been trained in home care should stay in the home care field [1] (N=4,215)	
Strongly Agree	52.1 (2,194)
Agree	29.7 (1,250)
Neither Agree nor Disagree	12.2 (514)
Disagree	4.6 (195)
Strongly Disagree	1.5 (62)
I have an obligation to remain in the home care field (occupation) [1] (N=4,153)	
Strongly Agree	42.5 (1,763)
Agree	31.7 (1,317)
Neither Agree nor Disagree	15.8 (656)
Disagree	7.1 (294)
Strongly Disagree	3.0 (123)
I feel a responsibility to continue in the home care field [1] (N=4,167)	
Strongly Agree	49.3 (2,054)
Agree	34.0 (1,418)
Neither Agree nor Disagree	12.0 (501)
Disagree	3.3 (138)
Strongly Disagree	1.3 (56)
Even if I could, I do not feel it would be right to leave the home care field [1] (N=4,111)	
Strongly Agree	35.6 (1,462)
Agree	28.7 (1,178)
Neither Agree nor Disagree	20.1 (825)
Disagree	10.6 (434)
Strongly Disagree	5.2 (212)
I would feel guilty if I left my home care job [1] (N=4,085)	
Strongly Agree	32.4 (1,322)
Agree	24.6 (1,006)
Neither Agree nor Disagree	20.6 (840)
Disagree	15.2 (622)
Strongly Disagree	7.2 (295)
I am thinking about leaving my current job as a home care worker [1] (N=4,138)	
Strongly Agree	6.4 (265)
Agree	7.5 (309)
Neither Agree nor Disagree	13.5 (559)
Disagree	36.1 (1,495)
Strongly Disagree	36.5 (1,510)
I have begun the process of looking for another home care job [1] (N=4,098)	
Strongly Agree	12.3 (504)
Agree	14.6 (597)
Neither Agree nor Disagree	16.5 (678)
Disagree	30.1 (1,232)
Strongly Disagree	26.5 (1,087)
I intend to quit my current job as a home care worker as soon as possible[1] (N=4,075)	
Strongly Agree	5.8 (235)
Agree	5.4 (221)
Neither Agree nor Disagree	10.9 (444)
Disagree	34.2 (1,392)
Strongly Disagree	43.8 (1,783)

NOTE: [1]Missing/null records constitute greater than 5 percent of the overall data; Missing/null records have been dropped from the denominator when computing percentages.

Community Care of North Carolina

Survey of Consumer Experience

We present a usability analysis and descriptive statistics for CCNC's parent and child survey data. NORC received data on responses to two surveys fielded by the CCNC's Child Health Accountable Care Collaborative (CHACC): 1) the Missed School/Work Survey, and 2) the Parent Survey (see Exhibit F.CHACC.1). An initial usability analysis indicates that several variables have incomplete or inconsistent information. CCNC has advised NORC on which variables could be considered to be complete, as well as which variables should not be included in NORC's analyses.

Exhibit F.CHACC.1: Overview of CHACC Surveys

Outcome Measures	Description of Survey
Missed School/Work	Self-administered 8-item questionnaire concerning missed school and work for caregivers. Questions are scored with various Likert scales. Survey is given multiple times at enrollment and then at quarterly intervals.
Parents Satisfaction	Self-administered 20-item questionnaire concerning parental satisfaction. Questions are scored with various Likert scales. Survey is given twice, at enrollment and either discharge or 6 months later.

We provide frequencies of the two surveys in Exhibits F.CHACC.2 and F.CHACC.3. The parent satisfaction survey is currently in two separate files because of a change in contractor. CCNC is working to establish a methodology to merge the files, but there are no clear linking variables in the current data sets. For this reason, Exhibit F.CHACC.3 provides frequencies for approximately half of the survey participants (one of the two files).

Results: School/Work Survey. There are complete data for most outcomes of interest. Half of the patients being seen by the awardee are four years or younger, 20 percent of the caregivers are employed fulltime, and that slightly over half are stay-at-home parents. Among those who are employed either full or part time, 49 percent report missing one to six days of work or school due to a child's illness.

Exhibit F.CHACC.2: Descriptive Characteristics for CCNC School/Work Survey

Characteristic	% (N)
Number of Persons	1238
Number of Records	2042
Unable to contact after 3 attempts/refused to participate	254
Completed surveys	1788
Age	
4 years or younger	48.8 (996)
5-9 years	17.0 (347)
10-15 years	16.2 (331)
16-20 years	6.9 (141)
Left blank	11.1 (227)
Attendance and Employment Variables	
School Attendance	85.0 (683)
Caregiver Attendance and Employment Variables	
Full time employment	19.9 (356)
Part time employment	7.8 (139)
FMLA Leave	0.9 (16)
Stay-at-home parent	52.4 (938)
Full time student	3.1 (56)
Unemployed but looking for work	7.9 (141)
Missing school or work due to child's illness (N=551)	
Missed 0 days	29.9 (165)
Missed 1-6 days	49.0 (270)
Missed 7-12 days	9.4 (52)
Missed 13 or more days	13.0 (72)

Results: Parent Satisfaction Survey. Based on the data from one of the two files provided to NORC, among caregivers, over 91 percent report either excellent, good, or very good satisfaction with the communication between providers about their child's care. Forty seven percent of caregivers report spending one to three hours coordinating care for the child, with 19 percent reporting spending more than nine hours in the past month. Over three-quarters of caregivers report sometimes, usually or always feeling stress about child's health. Additionally, 80 percent of caregivers report receiving emotional support when caring for child's illness.

Exhibit F.CHACC.3: Descriptive Characteristics for CCNC Parent Satisfaction Survey

Characteristic	% (N)
Number of Persons	595
Number of Records	674
Unable to contact after 3 attempts/refused to participate	76
Completed surveys	598
Relationship to child	
Father	30.0 (310)
Mother	34.0 (353)
Other	27.0 (300)
Declined	13.0 (124)
Ethnicity	
Latino or Hispanic	59.0 (699)
Not Hispanic	40.0 (429)
Unknown/Not reported	0.3 (4)
Caregiver education level	
No school	1.0 (12)
8th grade or less	11.0 (111)
Some high school but did not graduate	18.0 (188)
High school graduate or GED	29.0 (310)
Some college/vocational or technical school	28.0 (294)
Graduated from college/graduate school	13.0 (142)
Other	0.5 (5)
Language spoken most at home	
English	68.0 (737)
Spanish	37.0 (396)
Reported satisfaction with communication between providers (N=598)	
Excellent	41.0 (245)
Good or Very Good	50.6 (302)
Fair or Poor	6.8 (41)
Hours spent in past month coordinating care for child	
1-3 hours	46.5 (278)
4-6 hours	16.9 (101)
7-9 hours	3.8 (23)
More than 9 hours	18.7 (112)
Frequency of feeling stress about child's health	
Always	14.5 (87)
Usually	9.2 (55)
Sometimes	51.7 (309)
Never or don't know	13.2 (79)
Refused or left blank	11.4 (68)
Reported coping with demands of child's needs	
Very well	43.0 (257)
Fairly well	36.1 (216)
Adequately	6.5 (39)
Poorly or don't know	1.3 (8)
Refused or left blank	13.0 (78)
Receiving needed emotional support	
Reported receiving emotional support	80.4 (481)
Having time to take for themselves	
Always	4.2 (25)
Usually	11.7 (70)
Sometimes	46.8 (280)
Never	16.4 (95)

Survey of Workforce Training Experience

NORC's survey of CCNC workforce trainees is presented in our Second Annual Report to CMMI (2016).

Courage Kenny Rehabilitation Institute

Survey of Consumer Experience

NORC's survey is presented in our Second Annual Report to CMMI (2016).

Developmental Disabilities Health Services

Survey of Consumer Experience

NORC presented an initial analysis of the awardee's existing, validated, patient satisfaction post-survey data in our Second Annual Report to CMMI (2016), including a description of respondent demographics and findings on items related to service utilization, referral source, and three questions added to the survey at NORC's request; a subsequent analytic update is presented below.

At the end of July 2015, NORC received full survey data, including data for NORC's additional questions, for surveys administered September 2014 through June 2015. All of the patients eligible to participate in the home health model are considered high-risk and many have co-morbidities; their positive reports of care quality support the health home's aim to improve individual care needs, reduce emergency room visits, and lower out-of-home placement and institutionalization.

The findings below represent survey data collected on 182 patients enrolled in the DDHS health home model. Surveys were administered by DDHS clinic staff, who distributed hardcopy surveys to patients (or a proxy) during clinic visits. We examined the data to identify missing or invalid responses and reviewed open-ended responses to identify commonalities and themes. Some respondents did not answer all questions, and non-responses were excluded from the analysis due to the low frequency of occurrence. Unless otherwise noted, each survey item contains less than 5 percent non-response, and the percent reported reflects a sample size roughly equal to 182.

As shown in Exhibit F.DDHS.1, a majority of respondents (78 percent) were unable to complete the survey independently and received assistance via a proxy. The mean age of patient respondents is 50 years, from both patient- and proxy-reported survey data. Among patients who had a survey completed, either by themselves or with a proxy, there are more men than women (57 percent compared to 43 percent). When compared to the target population, the survey sample of patients is older (e.g., 6 percent of the target population is at least 65 years old, versus 18 percent of the survey population) and includes slightly more female respondents (37 percent of the target population is female). In addition, about 83 percent (119/144) of proxy respondents are female. A majority of respondents (79 percent) reported using DDHS for a singular purpose, with 92 percent of respondents receiving regular health care and routine medical services. Roughly three-fourths of patients were referred to DDHS by a health care provider, including DDHS staff at a provider agency/group home or through the Division of Developmental Disabilities, whereas a quarter of patients were referred to DDHS by a friend or relative or through self-

referral. About half of the respondents who reported more than one referral source (n=12) reported a provider agency/group home and DDHS.

Exhibit F.DDHS.1: Demographic Characteristics of DDHS Survey Respondents

Variable*	Respondents % (N)
Age of patient[1]	
15 to 26	4.4 (7)
27 to 45	26.3 (42)
46 to 64	51.2 (82)
65 to 86	18.1 (29)
Male[2]	**57.1 (97)**
Proxy report	**81.3 (148)**
Age of proxy[3]	
15 to 26	12.5 (17)
27 to 45	46.3 (63)
46 to 64	32.4 (44)
65 to 86	8.8(12)
Relation of Proxy	
Mother	19.1(27)
Sibling	4.3 (6)
Other/relative	0.7 (1)
Paid staff member	75.9 (107)
Had Referral [4]	96.4 (159)
Referral Source *(among persons w/ referral)*	
Self-referral	12.6 (20)
Friend or relative	2.5 (4)
Physician or other health care worker	7.6 (12)
Provider agency or group home	47.2 (75)
NJ/DDD or NY/OMRDD	19.5 (31)
Multiple	7.6 (12)
Other	3.1 (5)
Number of Services	
1	79.0 (143)
2 +	21.1 (38)

*Unless otherwise noted, each survey item contains less than 5 percent non-response.
Missing: 1=12 percent; 2=6 percent; 3=25 percent; 4=9 percent.

Respondents were asked to rate the accommodations and ease of access to the DDHS program on a scale of one to five, reflecting "poor" to "excellent." Exhibit F.DDHS.2 shows the results of these six questions relating to the personnel and facility characteristics. Only one measure had a "fair" report (i.e., ease of parking/unload), and the vast majority had "excellent" opinions of their visit. More than three-quarters found the facility easy to get to and the waiting room to be comfortable. Nearly all respondents rated the overall quality of the experience as above average or excellent.

Exhibit F.DDHS.2: Ease of Access and Quality of Visit to Facility

Variable	Respondents % (N)
Ease of Driving to Office	
Good	2.8 (5)
Above average	21.5 (39)
Excellent	75.7 (137)
Ease of parking/unload	
Fair	1.7 (3)
Good	8.3 (15)
Above average	21.0 (38)
Excellent	69.1 (125)
Ease of entering building/exam room	
Good	1.7 (3)
Above average	17.7 (32)
Excellent	80.7 (146)
Comfort of the waiting room	
Good	2.2 (4)
Above average	16.0 (29)
Excellent	81.8 (148)
Quality of health care this visit	
Good	1.7 (3)
Above average	12.3 (22)
Excellent	86.0 (154)
Quality & courtesy of office staff	
Above average	6.6 (12)
Excellent	93.4 (169)

Patients were asked to rate a series of statements based on their experiences in the DDHS office. They were shown the scale below and asked to indicate if they agreed or disagreed with each statement.

Disagree				**Agree**
1	**2**	**3**	**4**	**5**

Exhibit F.DDHS.3 shows the results of respondents who indicated they agree ("5") with the statements. For nearly all measures, the majority of respondents agreed with the statements.

Exhibit F.DDHS.3: Respondents who "Agree" with Quality of Care Statements

Variable	Respondents % (N)
I was given enough privacy during my visit	94.5 (172)
My questions were answered clearly and fully	94.4 (170)
Office staff were knowledgeable and courteous	95.6 (174)
My phone calls are handled effectively	94.5 (171)
Emergencies are handled efficiently	92.1 (163)
Prescription refill requests are handled smoothly	91.7 (166)
Overall, pleased with treatment from DDHA	93.3 (167)
I am able to get help on evenings and weekends when needed [1]	81.9 (136)
During the last year, I believe my health has improved	70.7 (123)
Usually I get to see the same person for my health care	94.0 (171)
Office visits are long enough to address all problems and questions	95.0 (172)
Staff listened to my concerns and treated me like a person	94.0 (171)
Staff explained everything about my condition and my care	93.3 (167)

[1]Missing: 1=9 percent.

The majority of survey respondents are proxy respondents for DDHS patients, and of proxy respondents, the vast majority are staff members from the patient's group home or facility. We examine whether there are statistically significant differences between patient and proxy reports, and between proxy reports by a family member or friend compared to a staff member. We examine t-tests of differences in mean values for questions ranked on a scale of one to five and chi-square statistics for yes/no questions. Exhibit F.DDHS.4 shows mean values for select questions comparing proxy and self-reported answers. We find almost no statistical differences on any outcomes, save for the result that slightly more self-respondents say that providers at DDHS worked together to solve their problems.

Exhibit F.DDHS.4: Selected Quality of Care and Outcomes, by Proxy and Self Report

Variable (1= Disagree, 5= Agree)	N	Proxy Mean	Self Mean
Quality & courtesy of office staff	179	4.8	4.9
I was given enough privacy during my visit	172	5.0	4.9
My questions were answered clearly and fully	170	5.0	4.9
Overall, pleased with treatment from DDHA	167	4.9	4.9
During the last year, I believe my health has improved	123	4.5	4.7
Usually I get to see the same person for my health care	171	5.0	4.9
Office visits are long enough to address all problems and questions	172	5.0	4.9
Staff listened to my concerns and treated me like a person	171	4.9	4.9
Staff explained everything about my condition and my care	167	4.9	4.9
Variable (Percent Agree)		**Proxy Agree**	**Self Agree**
Able to walk independently	141	80.0	77.3
No pain or other symptoms of health problems	105	68.4	57.7
Not limited in any of activities by poor health	135	76.3	75.7
Since coming to DDHA:			
Can take better care of own health	155	90.0	88.1
Has fewer problems with own medication	163	92.5	92.0
Providers at DDHA work together to solve health problems	180	95.0	100.0*

*Note: Difference between Proxy and Self-report is statistically significant at p<.05.

Exhibit F.DDHS.5 shows select responses on care questions comparing family or friend proxy respondents and staff-reported answers. We found few statistical differences. Staff were more likely to report respondents were able to go to school, day program, or work outside the home (95 percent compared to 85 percent) and able to walk independently (79 percent compared to 77 percent).

Exhibit F.DDHS.5: Selected Quality of Care and Outcomes, by Type of Proxy Report

Variable	Respondents % (N=141 unless otherwise noted)	
	Family or Friend	Staff
Quality of health care visit		
Good (n=3)	2.9	1.9
Above average (n=18)	20.6	10.4
Excellent (n=119)	76.5	87.7
I was given enough privacy during my visit	88.2	95.3
My questions were answered clearly and fully	90.9	94.3
Overall, pleased with treatment from DDHA	90.6	94.3
During the last year, I believe my health has improved	58.1	71.4
Usually I get to see the same person for my health care	91.2	94.4
Office visits are long enough	93.9	94.4
Staff listened to my concerns and treated me like a person	91.2	94.4
Staff explained everything	91.2	92.4
Able to go outside the home	85.3	95.3*
Walk independently	76.5	79.2*
No pain or other symptoms	56.3	59.6
Not limited in any activities	67.6	80.0
Can take better care of own health	93.1	86.7
Has fewer problems with own medication	93.9	92.2

*Difference is statistically significant between Family/Friend and Staff at p<.05. No measures were more than 5 percent missing.

Johns Hopkins University

Survey of Consumer Experience

In April 2014, J-CHiP incorporated three NORC-developed items into their existing, modified CAHPS survey for participants in J-CHiP's program, for those currently in the community arm but who may also have been in the hospital arm of the intervention. The Community Patient Satisfaction Survey includes questions regarding patient satisfaction with both J-CHiP clinicians and J-CHiP community health workers (CHWs). After reviewing J-CHiP's survey instrument and discussing NORC's survey goals within the scope of existing survey efforts, we agreed with the awardee that J-CHiP survey was comprehensive, with the addition of the following questions:

- During your most recent visit, did anyone in this provider's office talk about the purpose for taking your prescription medications? Yes/No/I do not remember
- During your most recent visit, did anyone in this provider's office help you understand the next steps in your medical care? Yes/No/I do not remember
- During your most recent visit, did anyone in this provider's office help you understand what you are supposed to do to take care of yourself? Yes/No/I do not remember

In May 2015, NORC received survey data from J-CHiP, including data for NORC's new questions, for surveys administered from November 2014 through March 2015. Case managers provided hard copies of

the survey to 495 patients; 329 had returned the form by this time for a response rate of approximately 66 percent.

Description of Survey Respondents. Exhibit F.J-CHiP.1 presents demographic information about participants in the survey. The findings below represent data collected from 279 of the survey respondents who had complete data for the Community Patient Satisfaction Survey. [416] Most respondents are females (72 percent), age 45 and above (88 percent), with some college education or less (89 percent). The majority of the sample is either Black/African American (57 percent) or White (40 percent) and in self-reported fair (34 percent) to good (29 percent) overall health. Approximately one quarter of respondents had help completing the survey (e.g., they had someone read them the questions, write down their answers, translate the questions, and/or answer the questions for them) (27 percent).

[416] Fifty cases were excluded from analysis due to incomplete data. In any given item with no more than 5 percent missing, the reported percentage includes missing in the denominator (i.e. n=279). If any item is missing more than5 percent, this is specified in the "Notes" section, and the reported percentage excludes those respondents from the denominator.

Exhibit F.J-CHiP.1: Demographic Characteristics of J-CHiP Community Patient Satisfaction Survey Respondents

Variable	Value % (N)
Number of Respondents	279
Gender	
Male	26.9 (75)
Female	71.7 (200)
Age	
25-34 years	3.9 (11)
35-44 years	7.5 (21)
45-54 years	20.8 (58)
55-64 years	26.2 (73)
65-74 years	14.7 (41)
75+ years	26.5 (74)
Race/Ethnicity	
Hispanic/Latino	1.1 (3)
White	40.1 (112)
Black/African American	57.0 (159)
Asian	0.7 (2)
American Indian/Alaska Native	1.4 (4)
Other	2.2 (6)
Highest Level of Education	
8th grade or less	15.8 (44)
Some high school, but did not graduate	27.2 (76)
High school graduate	31.2 (87)
Some college or 2 year degree	19.7 (55)
4 year college graduate	2.2 (6)
More than 4-year college degree	1.4 (4)
Overall Health	
Poor	6.8 (19)
Fair	34.4 (96)
Good	29.0 (81)
Very good	15.1 (42)
Excellent	13.6 (38)

Doctor-Patient Communication. Overwhelmingly, survey respondents reported that their doctors explained things clearly, listened carefully, showed respect, provided easy-to-understand instructions, knew their medical history, and spent enough time with them; see Exhibit F.J-CHiP.2.

Exhibit F.J-CHiP.2: Provider Communication, Community Patient Satisfaction Survey

During your most recent visit, did this provider:	Number of responders who answered yes/ Number of respondents	% Responded Yes
explain things in a way that was easy to understand?[1]	275/279	98.6
listen carefully to you?	266/279	95.4
give you easy to understand information about your health questions or concerns? [1]	248/254	97.6
seem to know the important information about your medical history?	265/279	95.0
show respect for what you had to say?	275/279	98.5
spend enough time with you?	274/279	98.2

NOTES: [2]Due to a skip pattern (participants were only instructed to answer this question if they reported speaking to their provider about any health questions or concerns during their most recent visit), more than 5 percent of respondents had null data for this question (N=25); therefore, these cases were excluded from the denominator in the percentage reported above.

Patient Education, Engagement, and Care Planning. Most J-CHiP respondents reported that during their most recent visit, someone in the provider's office helped them understand how to take care of themselves and what the next steps were in their medical care. A slightly lower percentage of respondents reported talking to someone in the provider's office about the purpose of taking their prescription medicine.

Approximately three-quarters of respondents noted that in the previous twelve months, they had a discussion with someone in the provider's office about specific goals for their health. However, a comparatively lower percentage of respondents reported having discussions about the challenges to taking care of their own health; see Exhibit F.J-CHiP.3.

Exhibit F.J-CHiP.3: Provider Education, Engagement, and Care Planning, Community Patient Satisfaction Survey

During your most recent visit, did anyone in this provider's office:	Number of responders who answered yes/ Number of respondents	% Responded Yes
help you understand what you are supposed to do to take care of yourself?	229/279	82.1
talk about the purpose for taking your prescription medicine?	198/279	71.0
help you understand the next steps in your medical care?	218/279	78.1
In the last 12 months, did anyone in the provider's office:		
talk with you about specific goals for your health?	217/279	77.8
ask you if there are things that make it hard for you to take care of your health?	184/279	65.9

Attention to Mental and Emotional Health. Roughly three-quarters of J-CHiP community respondents reported being asked if they experienced a period of sadness, emptiness, or depression in the last 12 months. A smaller portion of respondents reported having a discussion about personal or family problems, substance abuse, or mental or emotional illness; see Exhibit F.J-CHiP.4.

Exhibit F.J-CHiP.4: Provider Attention to Mental and Emotional Health, Community Patient Satisfaction Survey

In the last 12 months, did anyone in the provider's office:	Number of responders who answered yes/number of responders	% Responded Yes
Ask you if there was a period of time when you felt sad, empty, or depressed?	201/279	72.0
Talk to you about a personal problem, family problem, alcohol use, drug use, or a mental or emotional illess[2]	181/279	64.9

Patient Ratings of Provider. Overall, J-CHiP community respondents were extremely satisfied with their providers. On a scale of 0 to 10, with 0 being the worst and 10 being the best, J-CHiP patients rated their doctors an average of 8.9. When asked to rate their trust in their doctors on scale of 0 to 10, with 0 being do not trust this provider at all and 10 being trust this provider completely, J-CHiP community patients rated their doctor's an average of 9.0. Furthermore, a total of 95 percent of respondents said they would recommend the provider's office to their family and friends.

Interestingly, we found a statistically significant difference by respondent's race in the rating of providers from best to worst, such that Whites (M=9.15, SD=1.42) were significantly more likely to rate their providers higher than were Blacks (M=8.69, SD=1.89).[417] However, we found no significant race differences in patient ratings of trust in the provider or recommendations to family and friends.

CHW-Patient Communication. Similar to J-CHiP community respondent's ratings of communication with clinicians, respondents were very positive about communication with CHWs. Respondents reported that their CHWs explained things clearly, listened carefully, and showed respect for what they had to say; see Exhibit F.J-CHiP.5.

Exhibit F.J-CHiP.5: CHW Communication, Community Patient Satisfaction Survey

During your most recent interaction, did this CHW:	Number of responders who answered yes/ Number of responders	% Responded Yes
Explain things in a way that was easy to understand?[1]	244/257	94.9
Listen carefully to you?	255/279	91.4
Show respect for what you had to say?	261/279	93.6

NOTES: [1]More than 5 percent of respondents had null responses for this question (n=22); therefore, these cases were excluded from the denominator in the percentage reported above.

Patient Education, Engagement, and Care Planning by CHWs. Most J-CHiP respondents noted that in the previous twelve months, a CHW had asked them if there were things that made it hard for them to take care of their health and helped them to get the services they needed to take care of their health; see Exhibit F.J-CHiP.6.

[417] T-Test as follows: t (266) = 2.19, p <.05.

Exhibit F.J-CHiP.6: CHW Education, Engagement, and Care Planning, Community Patient Satisfaction Survey

During the last 12 months, did this CHW:	Number of responders who answered yes/ Number of respondents	% (N) Responded Yes
Ask you if there are things that make it hard for you to take care of your health?	226/279	81.0
Help you to get the services that you need to take care of your health?	230/279	82.4

Patient Ratings of CHWs. Survey respondents were very satisfied with their CHWs. A total of 92 percent of respondents said they would recommend the CHW to their family and friends. Additionally, on a scale of 0 to 10, from least to most trust in the CHW, J-CHiP patients rate their CHWs an average of 9.1. We find no significant differences in patient ratings of CHWs by race.

Survey of Workforce Experience

The awardee has shared raw data from two of its workforce surveys, conducted as part of the HCIA-funded innovation program. These data are part of J-CHiP's Skilled Nursing Facility (SNF) Collaborative Workforce Survey (pre-implementation: 2012; post-implementation: 2014, 2015) (hospital arm of the intervention), and their second annual Community Staff Survey (2014) (community arm of the intervention).

Hospital Arm: Skilled Nursing Facility (SNF) Collaborative Workforce Survey. J-CHiP has fielded this survey to collect data from the five partner SNFs participating in the hospital (post-acute) arm of its program. The data file prepared for NORC by J-CHiP in December of 2015 included responses from J-CHiP SNF staff in the following domains:

- Perceptions of coordination and continuity of care between SNF and Johns Hopkins' (JH) inpatient and ED facilities; and
- Perceptions of communication and collaboration between SNF and JH's inpatient and ED facilities.

The findings below represent cross-sectional data from three years of the Skilled Nursing Facility (SNF) Collaborative Workforce Survey (pre-implementation: 2012; post-implementation: 2014, 2015); response rates were 26 percent in 2012, 47 percent in 2014, and 36 percent in 2015.[418] Where variation in response patterns indicated a potential statistically significant difference between the pre- and post- implementation data, we performed t-tests and report the results in the discussion below.

[418] In 2012, 146 of 570 SNF staff completed the J-CHiP survey, in 2014 342 of 732, and in 2015, 288 of 802. Please note, the 16 Future Care Canton Harbor staff that completed the pre-implementation survey are not included in the 2012 response rate calculation as J-CHiP was unable to provide the number of total staff due to turnover.

Description of Survey Respondents. Staff were surveyed across the five J-CHiP partner SNFs[419]; the majority of respondents were from the Riverview Care Center or Future Care North Point. Most respondents were nursing staff, with smaller percentages of rehabilitation staff, medical staff, and social workers; see Exhibit F.J-CHiP.7.

Exhibit F.J-CHiP.7: Skilled Nursing Facility (SNF) Workforce Survey: Respondents, J-CHiP Hospital Arm

	Pre-Implementation	Post-Implementation	
Year	**2012**	**2014**	**2015**
Number of Respondents	162	341	288
SNF Facility % (N)			
Riverview Care Center	43.8 (71)	25.2 (86)	36.1 (104)
Future Care North Point	31.5 (51)	33.7 (115)	35.1 (101)
Brinton Woods Nursing Center	9.9 (16)	19.6 (67)	8.7 (25)
Future Care Canton Harbor	9.6 (16)[1]	14.1 (48)	8.3 (24)
Genesis Heritage	4.8 (8)	7.3 (25)	11.8 (34)
Staff Type % (N)			
Nursing (e.g., Nursing Assistant, Bedside LPN, Nurse Manager)	66.0 (107)	65.7 (224)	66.7 (192)
Rehabilitation (e.g., PT, OT, Speech)	12.3 (20)	10.0 (34)	10.4 (30)
Medical (e.g., MD/DO, PA/NP)	1.9 (3)	5.3 (18)	5.6 (16)
Social Worker/Social Services	5.6 (9)	3.8 (13)	2.8 (8)
Recreation Therapy/Activity	0.0 (0)	2.6 (9)	2.4 (7)
Quality Management	3.1 (5)	0.6 (2)	1.0 (3)
Administrator/Assistant Administrator	1.2 (2)	1.2 (4)	1.0 (3)
Other (e.g., Respiratory Therapist, Clinical Nutrition)	9.6 (16)	10.9 (37)	10.1 (29)

NOTE: [1]Sixteen respondents from Future Care Canton Harbor completed the pre-implementation survey in February of 2013; their data are combined with the 2012 pre-implementation survey responses for the purposes of conducting pre- versus post-implementation analysis.

Coordination and Continuity of Care. A main objective of the J-CHiP hospital arm is to provide coordination and continuity of care services for patients discharged from the JH facilities to the five partner SNFs, through increased communication of patients' transition of care to the SNF and the introduction of selected treatment protocols (e.g., CHF, COPD, or delirium).

In each year of survey administration, staff answered questions regarding their perceptions of care coordination and the continuity of care from JH's inpatient and ED facilities to their SNF facility. Respondents were asked to rate their level of agreement with a statement on a scale from 1 (strongly disagree) to 5 (strongly agree). By the second year of post-implementation period, approximately three-

[419] Fifty-seven respondents from JH Bayview Care Center were excluded from the pre-implementation survey analysis, because this facility was closed and was not surveyed in the post-implementation period. Five respondents from Riverview Care Center were excluded from the pre-implementation survey analysis, because they did not complete the survey until 2014. Three respondents who selected "other" facility in the pre-implementation period, and one respondent who selected "other" for the 2014 post-implementation survey, were also excluded from analysis.

quarters of respondents (77 percent) agreed that their facility had done an effective job of improving how they clinically managed common medical conditions (M=4.1, SD=1.0).[420]

As shown in Exhibit F.J-CHiP.8, respondents report greater understanding of JH's patient goals in the post-implementation period, as compared to the pre-implementation period, although this difference does not reach statistical significance. Respondents also report greater patient involvement in their own care by the second year of the post-implementation period as compared to previous years (not statistically significant).

The J-CHiP SNF staff report slightly higher satisfaction with continuity of care in the post-implementation period (not statistically significant), rating the continuity of care from JH inpatient facilities to their SNF facility, and from their SNF facility to JH ED facilities higher in the 2015 post-implementation period than in the pre-implementation period. In addition, respondents report significantly greater usage of information technology to improve the patient process from the pre- to post-implementation periods.[421]

Exhibit F.J-CHiP.8: SNF Workforce Survey: Staff Perceptions of Coordination and Continuity of Care, J-CHiP Hospital Arm

Year	Pre-Implementation		Post-Implementation			
	2012		2014		2015	
	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
When first admitted, I understand the goals of care for Johns Hopkins' patients at my facility.	3.8 (1.0)	157	3.9 (1.2)	314	3.9 (1.2)	272
At my facility, patients are involved in their care.	4.1 (1.1)	160	4.1 (1.1)	323	4.3 (1.0)	282
I am satisfied with my ability to provide continuity of care from Johns Hopkins' inpatient units to my facility.	4.0 (1.0)	159	4.0 (1.1)	316	4.1 (1.1)	276
I am satisfied with my ability to provide continuity of care from my facility to Johns Hopkins' emergency departments.	3.9 (1.1)	154	3.9 (1.1)	307	4.0 (1.1)	259
My facility uses information technology to improve the patient transfer process	3.5 (1.2)	147	3.9 (1.1)**	315	4.0 (1.1)**	262

NOTE: * = p <.05, ** = p < .01, *** p <.001.

Continuity of Care and Readmissions. A further goal of the J-CHiP program is to reduce preventable re-hospitalizations through improved continuity of care. In each year of the SNF workforce survey, respondents were asked whether poor continuity of care led to preventable readmissions for JH's patients at their facility. As seen in Exhibit F.J-CHiP.9, respondents' perceptions that poor continuity led to preventable readmissions changed little on a 5-point scale ranging from "never" to "very frequently" with mean responses of 2.7 in 2012 and 2015, and a small dip to 2.5 in 2014.

[420] The wording of this question was modified for the post-implementation surveys; therefore, no comparison can be made with the pre-implementation period.

[421] Comparing 2012 with 2014, t-test $t(460)=-3.4$, $p<.01$; and comparing 2012 with 2015, t-test $t(407)=-4.1$, $p<.01$.

Exhibit F.J-CHiP.9: SNF Workforce Survey: Continuity of Care and Readmissions, J-CHiP Hospital Arm

Variable	Pre-Implementation	Post-Implementation	
Year	2012	2014	2015
Number of Respondents[1]	**146**	**305**	**253**
For Johns Hopkins' patients at my facility, poor continuity of care leads to preventable readmissions: % (N)			
Very frequently	0.7 (1)	3.9 (12)	2.8 (7)
Frequently	15.1 (22)	11.5 (35)	14.2 (36)
Occasionally	48.6 (71)	36.7 (112)	44.7 (113)
Rarely	27.4 (40)	30.5 (93)	29.6 (75)
Never	8.2 (12)	17.4 (53)	8.7 (22)
Mean Response (Standard Deviation)	2.7 (0.8)	2.5 (1.0)	2.7 (0.9)

NOTE: [1]Missing/null records constituted greater than 5 percent of the overall data; in this case, missing/null records are dropped from the denominator when computing percentages.

Priorities to Improve Transitions of Care. To assess improvement in coordination and continuity of care, respondents were asked to select up to three areas that the J-CHiP SNF Collaborative needed to address to improve transitions in care, followed by a question asking them to select any areas in which they had seen improvement since the J-CHiP SNF Collaborative began in January 2013. The areas related to coordination or continuity of care are summarized in Exhibit F.J-CHiP.10 and Exhibit F.J-CHiP.11 below.

In 2014, 28 percent of respondents selected addressing management of common medical conditions to reduce unnecessary hospitalizations as an area that had improved since the beginning of the SNF collaborative. In 2015, an even greater proportion of respondents selected this as an area of improvement (37 percent). We see similar increasing trends of improvement for coordination of follow-up appointments at SNF discharge (2014: 22 percent; 2015: 28 percent) and for written documentation provided from hospital staff to SNF to document patient condition/clinical status (2014: 37 percent; 2015: 46 percent). We also see an increasing trend in the number of respondents reporting a need for improvement in providing written documentation to the SNFs (2014: 38 percent; 2015: 49 percent). The 2015 open-ended responses corroborated this point; 10 of 23 mentioned issues with the discharge summaries not being accurate or provided in a timely manner. For example, one SNF staff member reported "receiv[ing] discharge instructions with a doctor's name to make an appointment, but that [the] doctor stated he did not know the patient."

Exhibit F.J-CHiP.10: SNF Workforce Survey: Identified Priorities to Improve Transitions of Care, J-CHiP Hospital Arm

Item	Post-Implementation			
	2014		2015	
	% selecting need to address to improve care transitions (N=295) [1,2]	% selecting area has improved since the J-CHiP SNF Collaborative began (N=263) [1,3]	% selecting need to address to improve care transitions (N=237) [1,2]	% selecting area has improved since the J-CHiP SNF Collaborative began (N=216) [1,3]
Address management of common medical conditions within the SNF setting to reduce unnecessary re-hospitalizations or transports to outpatient diagnostic studies or consultations.	30.8 (91)	27.8 (73)	26.6 (63)	37.0 (80)
Address written documentation provided from hospital staff to SNF to more accurately document patient condition/clinical status.	38.3 (113)	37.2 (98)	49.4 (117)	45.8 (99)
Address written documentation provided from hospital staff to SNF staff to more accurately document plan of care for patient	38.3 (113)	33.1 (87)	38.8 (92)	26.4 (57)
Address coordination of follow-up appointments at SNF discharge	27.4 (81)	21.7 (57)	27.0 (64)	27.8 (60)

NOTES: [1]Missing/null records constitute greater than 5 percent of the overall data; missing/null records are dropped from the denominator when computing percentages. [2]Respodents could select three of 9 items. [3]Respondents could select up to 9 items.

Communication and Collaboration between JH and SNFs. Communication and collaboration are necessary components of J-CHiP's objective to provide coordination and continuity of care services for patients discharged from the JH's facilities to the five partner SNFs.

As shown in F.J-CHiP.12, in both years of the post-implementation period compared to the pre-implementation period, respondents reported higher levels of collaboration between their SNF facility and JH's ED (2014 and 2015) and inpatient (2014) facilities. Respondents also reported a statistically significantly higher ability to contact JH's medical professionals for patient questions in the 2014 post-implementation period, compared with the pre-implementation period ($t(459)=-2.1$, $p < .05$). SNF staff consistently reported that teamwork between staff at their facility and staff at JH's ED and inpatient departments was encouraged.

Exhibit F.J-CHiP.11: SNF Workforce Survey: Communication and Collaboration between Johns Hopkins and SNFs, J-CHiP Hospital Arm

Year	Pre-Implementation		Post-Implementation			
	2012		2014		2015	
	Mean (SD)	N	Mean (SD)	N	Mean (SD)	N
The relationships between staff at my facility and staff at Johns Hopkins' inpatient departments are typically collaborative.	3.7 (1.1)	149	3.8 (1.1)	309	3.7 (1.2)	267
The relationships between staff at my facility and staff at Johns Hopkins' emergency departments are typically collaborative.	3.6 (1.1)	151	3.8 (1.1)	307	3.8 (1.1)	259
I have a sense that teamwork between staff at my facility and staff at Johns Hopkins' inpatient departments is encouraged.	3.8 (1.1)	155	3.8 (1.1)	319	3.8 (1.1)	272
I have a sense that teamwork between staff at my facility and staff at Johns Hopkins' emergency departments is encouraged.	3.7 (1.2)	149	3.8 (1.1)	311	3.9 (1.1)	267
I am able to contact the appropriate Johns Hopkins' medical professional when I have a question important to the treatment of a patient.	3.4 (1.2)	151	3.7 (1.2)*	310	3.6 (1.2)	263

Note: * = p <.05, ** = p < .01, *** p <.001.

Priorities to Improve Communication. To assess improvement in communication and collaboration, respondents were asked to select up to three areas that the J-CHiP SNF Collaborative needed to address to improve transitions in care, followed by a question asking them to select any areas they had seen improvement in since the J-CHiP SNF Collaborative began in January 2013. One item in the list of areas pertains to communication and collaboration, namely, the presence of communication barriers between hospitals and SNFs. Between 2014 and 2015, we see an increasing trend in the number of respondents reporting a need for improvement in the communication barriers between SNFs and hospitals (36 percent in 2014, 44 percent in 2015). Five of 23 respondents who opted to write in an area that needed improvement cited issues with communication and requested a "verbal report over the phone for the patient being transferred to the SNF."

Community Arm: Survey of Workforce Experience. To better understand workforce development as an aspect of J-CHiP's community arm, we explore selected findings from our analysis of the awardee's own survey of five categories of providers involved in interprofessional teams that support the awardee's community arm. In December 2015, NORC received survey data from J-CHiP's second annual Clinician and Staff Survey. The survey was administered in 2014 during staff meetings and/or online via the Survey Monkey platform. Staff were offered a small engagement token to encourage completion of the survey (a $5 pen). The data file prepared for NORC by J-CHiP included responses from J-CHiP staff for the community arm of the intervention, in the following domains:

- Perceptions of chronic care management most important for improving quality and achieving cost goals;
- Perceptions of multi-disciplinary team performance; and
- Perceptions of relational coordination with other Johns Hopkins team members.

The findings that follow represent data collected from 114 of the survey respondents who completed the J-CHiP Community Staff Surveys.

Description of Survey Respondents. Five slightly different versions of the same survey were administered to the following provider types:

- Primary care providers (PCPs). Physicians and nurses in Johns Hopkins (JH) affiliated clinics who provide primary care services.(n=57, 37 percent response rate)
- Case managers (CMs). Nurses in JH clinics who perform initial assessment, and provide self-management support and care coordination.(n=18, 75 percent response rate)
- Community health workers (CHWs). CHWs who provide health education, health barrier mitigation and referrals to community resources.(n=22, 100 percent response rate)
- Health behavior specialists (HBSs). Licensed clinical social workers and counselors in JH clinics who provide behavior change counseling in the clinic(n=10, 100 percent response rate)
- Tumaini-Sisters Together and Reaching, Inc., CHWs and a CM based at the STAR office and working in East Baltimore neighborhoods who engage residents in their healthcare, make referrals to primary care clinics and community resources, and conduct health barrier mitigation.(n=7, 100 percent response rate).

The five versions had tailored question to the particular staff role. Due to small sample sizes, we were unable to perform significance testing between the provider types.

Chronic Care Management. All five J-CHiP community provider types answered questions regarding their experiences with chronic care management for patients at highest risk of hospitalization; see Exhibit F.J-CHiP.12 for summary findings. Respondents were asked to rate their satisfaction with different aspects of care provided by themselves and the care team on a scale from 1 (very dissatisfied) to 6 (very satisfied). Overall, J-CHiP providers were satisfied with the care they delivered, reporting the highest level of satisfaction with their ability to communicate with patients and family caregivers, and provide them with referrals to community resources. The lowest average satisfaction score (4.3) was with the efficiency of office visits.

Exhibit F.J-CHiP.12: Clinician and Staff Survey: Satisfaction with Chronic Care Management, J-CHiP Community Arm

Variable	Value
Number of Respondents	114
Regarding your chronically ill patients at highest risk of hospitalization, how satisfied are you with the following aspects of care that you and the care team provide:	**Mean Response (Standard Deviation)**
Referrals of patients to community resources (not answered by PCPs; N=55)	5.2 (0.8)
Referrals of family caregivers to community resources (not answered by PCPs; N=55)	5.1 (0.9)
Communicating with patients	4.9 (1.1)
Communicating with family caregivers	4.7 (1.1)
Access to evidence-based guidelines for chronic conditions	4.7 (1.0)
Availability of clinical information regarding your patients	4.7 (1.2)
Motivating patients to participate in maximizing their health	4.6 (1.1)
Monitoring patients' chronic conditions	4.6 (1.2)
Efficiency of practice team	4.5 (1.4)
Educating family caregivers	4.4 (1.3)
Coordinating the care received from all providers	4.4 (1.3)
Efficiency of office visits	4.3 (1.4)

Although small sample sizes preclude the calculation of statistical differences between the provider groups, there appears to be a higher level of satisfaction among CHWs, compared with PCPs, with regard to every aspect of care management and especially with the efficiency of office visits (CHWs: M=5.5, SD=0.74 versus PCPs: M=3.6, SD=1.4), the efficiency of the practice team (CHWs: M=5.6, SD=.58 versus PCPs: M=3.8, SD=1.4), and the coordination of care received from all providers (CHWs: M=5.6, SD=0.59 versus PCPs: M= 3.8, SD=1.3).[422]

Multi-Disciplinary Team Performance. All five J-CHiP community provider types answered questions regarding their perceptions of the multi-disciplinary team approach; findings are summarized in Exhibit F.J-CHiP.13. Overall, J-CHiP providers agreed that they were performing well as a team (84 percent). Most respondents reported that their role was clear (90 percent) and that each member of office/practice made a contribution to its success (87 percent). The majority of respondents also agreed that their office/practice was making appropriate use of their knowledge and skills (83 percent), and that other members of their team had the skills to back them up if necessary (84 percent). Notably, only 37 percent of respondents among all provider types felt their office/practice had enough resources or people to meet the needs of their patients, which may be due to the high-risk complex patient population that these providers serve. Primary Care Providers and Care Managers were the most likely to report this lack of resource and personnel (32 of 55 PCPs and 9 of 18 CMs).

[422] NORC shared this finding with this awardee. The J-CHiP leadership noted that the difference in score by type of provider may reflect the fact that CHWs are based in community settings rather than in clinics, which may limit a provider's interactions with or knowledge about the roles of CHWs in the innovation. They hypothesize that primary care providers' workload may preclude their greater engagement in the HCIA-funded work.

Exhibit F.J-CHiP.13: Community Staff Survey: Multi-Disciplinary Teamwork, J-CHiP Community Arm

Variable	Value		
Number of Respondents	N=114		
Please indicate how much you agree or disagree with each of the following statements about your office/ practice.	**Disagree /Strongly Disagree % (N)**	**Neutral % (N)**	**Agree /Strongly Agree % (N)**
I clearly know my role in this office/ practice	2.6 (3)	6.1 (7)	90.4 (103)
Each member of this office/ practice makes a contribution to the office/ practice's success	5.3 (6)	7.0 (8)	86.8 (99)
People in this office work together like a team	7.0 (8)	7.0 (8)	84.2 (96)
Other office/ practice members have the skills and knowledge to back me up if necessary	3.5 (4)	12.3 (14)	84.2 (96)
This office/ practice makes appropriate use of my knowledge and skills for meeting the needs of our patients	7.0 (8)	8.8 (10)	83.3 (95)
My job is basically a "one person show" – there is little need to work closely with others	72.8 (83)	9.6 (11)	17.5 (20)
Office/ practice members are encouraged to express alternative viewpoints about service and clinical quality issues	7.0 (8)	20.2 (23)	71.1 (81)
Our office/ practice has the right mix of people (skills and knowledge) to meet the needs of our patients	16.7 (19)	15.8 (18)	64.0 (73)
This office/ practice makes appropriate use of innovative support workers to coordinate and fill traditional gaps in care	11.4 (13)	24.6 (28)	62.3 (71)
Our office/ practice has enough people and resources to meet the needs of our patients	39.5 (45)	21.9 (25)	36.8 (42)

Relational Coordination with J-CHiP Hospital Arm Team. Primary Care Providers (n=57) and Care Managers (n=16) were asked a series of questions regarding relational coordination with the HCIA-funded intervention's hospital arm, which includes multidisciplinary acute care teams (ACTs) based in two Johns Hopkins hospitals. Respondents were asked to rate their level of coordination on a scale from one (never/nothing) to five (always/completely), with higher scores representing more relational coordination. Respondents reported mean levels of coordination ranging from 2.8 to 3.3, indicating that on average, PCPs and CMs had occasional/some coordination with acute care teams; see Exhibit F.J-CHiP.14. The highest ratings by PCPs and CMs are given for acute care teams' respect for the work performed by the community arm and for shared patient goals between the two intervention arms, while PCPs and CMs give the lowest ranking to what is their perception of acute care teams' knowledge of the work of community arm team members.

Exhibit F.J-CHiP.14: Community Staff Survey: Relational Coordination with Acute Care Teams, J-CHiP Community Arm

Variable	Value
Number of respondents	N=73
Thinking about the acute care team (i.e., hospitalists and discharge planners):	**Mean (Standard Deviation)**
How much do they respect the work you do?	3.3 (1.0)
How much do they share your goals about patients who have been hospitalized?	3.3 (1.0)
Does the acute care team communicate with you accurately about patients who have been hospitalized?	3.1 (1.1)
When there are problems, do they work with you to try to solve the problem?	3.0 (1.1)
Does the acute care team communicate with you in a timely way about patients who have been hospitalized?	2.9 (1.1)
How frequently do you communicate with the acute care team about patients who have been hospitalized?	2.9 (1.0)
How much does the acute care team know about the work you do?	2.8 (0.9)

PCPs are more likely to report that the ACTs communicated with them accurately about their patients (M = 3.2, SD = 1.0) than are CMs (M=2.7, SD=1.3). In addition, PCPs are slightly more likely to report that ACTs knew about the work that they did (M=2.9, SD=0.8) than are CMs (M=2.6, SD=1.3).

Johns Hopkins University School of Nursing

Survey of Consumer Experience

As of June 30th, 2015, JHUSON had assessed 779 possible participants for the CAPABLE intervention. Of those assessed, 281 met the program inclusion criteria.[423,424] We summarize data from all the program participants who completed: 1) both a baseline survey assessment and 5 month post-enrollment reassessment of activities of daily living (ADLs; bathing, grooming, transferring, toileting, eating, walking across a small room) and 2) instrumental activities of daily living (IADLs; meal preparation, light housework, shopping for personal items, making telephone calls, laundry, taking medications, managing money), as well as 3) the health related quality of life outcomes. The sample consists of 190 program participants.

Description of JHUSON Participants. Exhibit F.JHUSON.1 presents demographic information about CAPABLE participants at baseline. Most participants are Black (82 percent) and female (86 percent), with no more than a high school education (88 percent). The average age of participants is 74 years.

[423] Inclusion criteria include: being 65 years of age or older, being eligible or at-risk for Medicaid, reporting at least some difficulty with at least one activity of daily living, living in a house, having a mini-mental state examination score ≥ 24, not currently receiving nursing or occupational therapy home care, not hospitalized more than three times in the prior twelve months).

[424] A review of the data from the first 100 participants is summarized in Szanton, Sarah L., Jennifer L. Wolff, Bruce Leff, Laken Roberts, Roland J. Thorpe, Elizabeth K. Tanner, Cynthia M. Boyd et al. "Preliminary Data from Community Aging in Place, Advancing Better Living for Elders, a Patient-Directed, Team-Based Intervention to Improve Physical Function and Decrease Nursing Home Utilization: The First 100 Individuals to Complete a Centers for Medicare and Medicaid Services Innovation Project." Journal of the American Geriatrics Society 63, no. 2 (2015): 371-374.

Exhibit F.JHUSON.1: Baseline Characteristics of JHUSON Survey Respondents

Variable	Value % (N)
Number of Respondents	**(190)**
Gender	
Male	14.2 (27)
Female	85.8 (163)
Age	
65-69 years	32.6 (62)
70-74 years	25.3 (48)
75-79 years	17.9 (34)
80-84 years	14.2 (27)
85+ years	10.0 (19)
Race/Ethnicity	
White	14.2 (27)
Black	81.6 (155)
Hispanic	1.1 (2)
Asian	1.1 (2)
American Indian	0.5 (1)
Mixed	1.6 (3)
Highest Level of Education	
< High School	40.5 (77)
High School or General Education Development	47.9 (91)
Bachelor's Degree	10.0 (19)
Master's Degree	1.6 (3)

Reported Difficulties with ADLs and IADLs. Through individualized goal planning and coordinated visits from occupational therapists, nurses, and handymen, the CAPABLE intervention aims to reduce difficulties in performing ADLs and IADLs. At baseline, participants reported difficulty with an average of 4.06 ADLs of the 8 that were measured (SD=1.97). After being in the program for 5 months, respondents on average noted a significant reduction in difficulties to 2.15 ADLs (SD=2.01).[425] There was also a statistically significant decrease in IADLs from an average of 4.11 at baseline (SD=2.07) to 3.05 after 5 months (SD=2.22).[426] See Exhibit F.JHUSON.2 for a summary.

[425] T-Test for this reported change, $t(189) = 13.3$, $p < .001$.

[426] T-test for this reported change, $t(189)=8.13$, $p<.001$.

Exhibit F.JHUSON.2: Reported Difficulties with ADLs and IADLs at Baseline and Reassessment

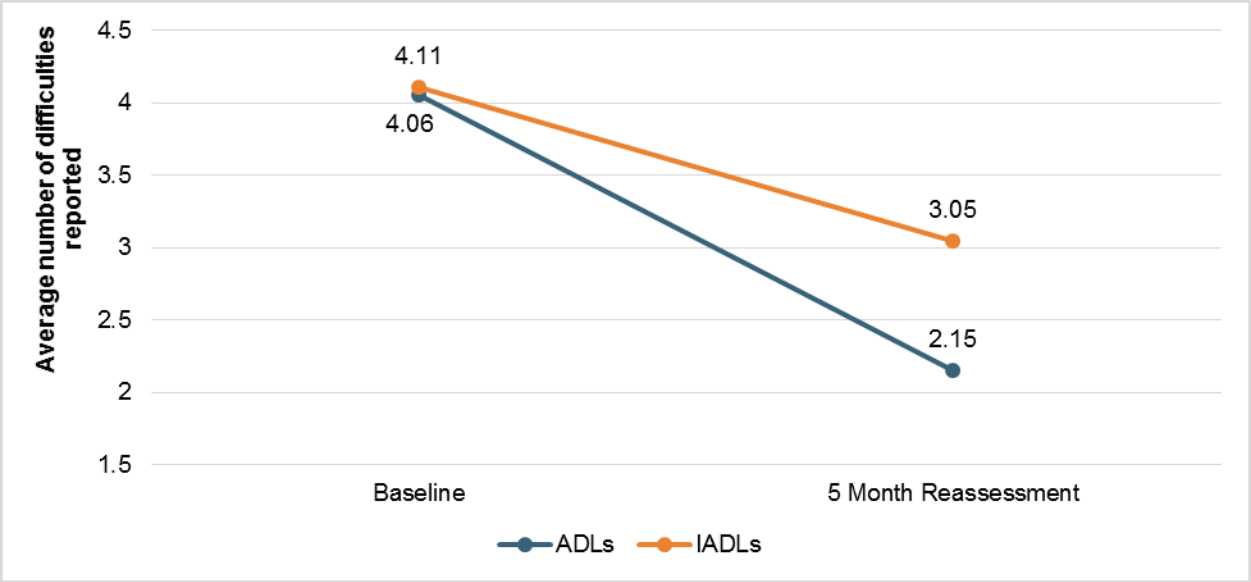
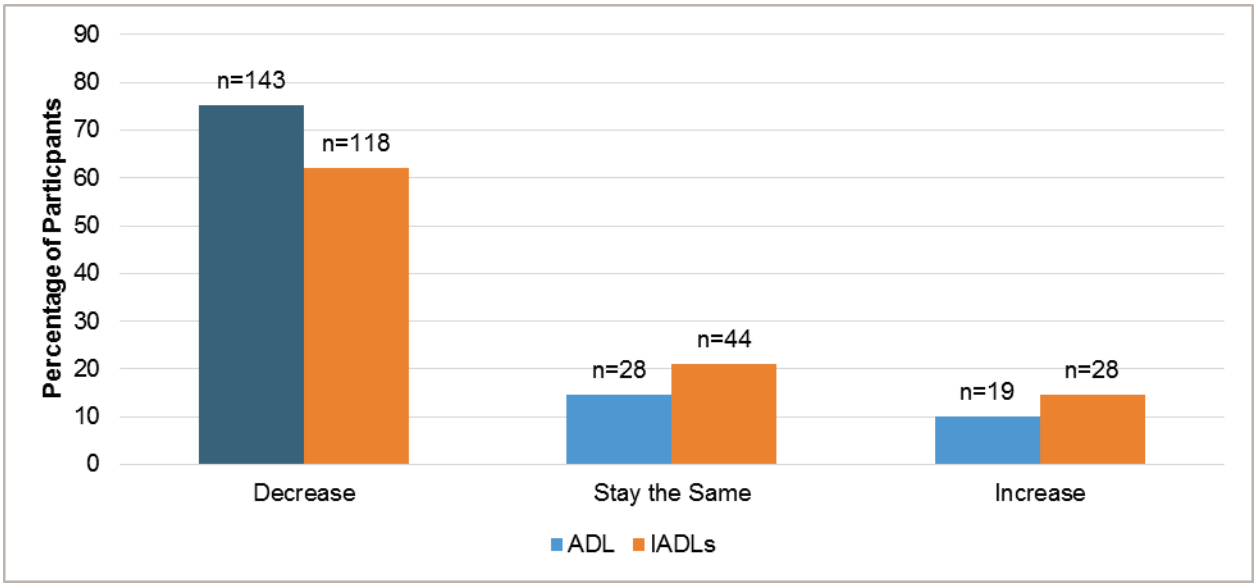


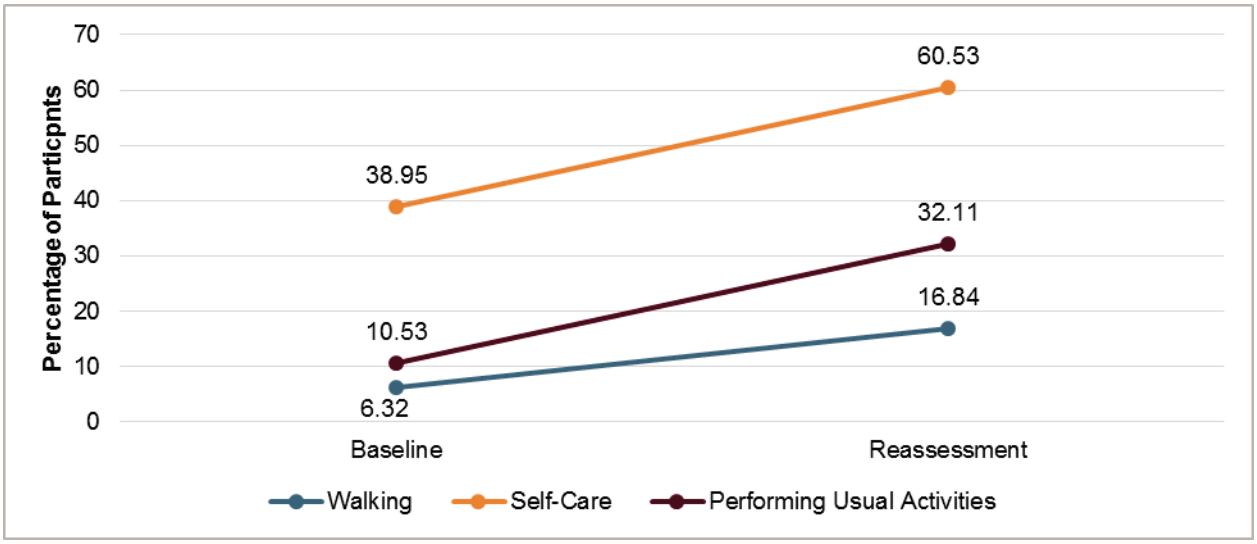
Exhibit F.JHUSON.3 shows the percentage of participants for whom difficulties in performing ADLs decreased, stayed the same, or increased (N=190). The number of ADLs for which participants reported having some to a lot of difficulty decreased for 75 percent of the participants, stayed the same for 15 percent, and increased for 10 percent. We see similar proportions for IADLs, with 62 percent of participants reporting decreases, 23 percent reporting no change, and 15 percent reporting increases.

Exhibit F.JHUSON.3: Change in ADLs and IADLs Reported as Difficult from Baseline to Reassessment



Health Related Quality of Life. Participants were asked to rate their current health on a scale from 1 (no problem with performing activity) to 3 (unable to perform activity). From baseline survey to reassessment at 5 months post-enrollment, we see a near tripling in the percentage of participants with no difficulty performing usual activities (e.g., work, study, housework) or walking. The number of participants reporting no difficulties with self-care started off the highest and increased by roughly 20 percentage points; see Exhibit F.JHUSON.4.

Exhibit F.JHUSON.4: Percentage of Participants Reporting No Difficulties



Participants were also asked to rate how often they had been bothered by a series of problems over the past two weeks (e.g. feeling down, trouble falling asleep, feeling tired, poor appetite) at both baseline and reassessment, to measure depression. For those who reported depressive symptoms at baseline and had complete data at reassessment (Patient Health Questionnaire-9 score < 5, N=96), depressive symptoms significantly decreased from an average of 10.04 (SD=4.63) to an average of 6.69 (SD=5.04).[427]

Finally, to assess improvement in fear of falling, or fall prevention self-efficacy, 187 participants rated their confidence in being able to perform 10 activities without falling (e.g., taking a bath or shower, getting in and out of bed, getting dressed or undressed). Confidence in fall prevention was measured at baseline and five months post-enrollment, along a 1 to 10 scale, with 1 being very confident and 10 being not confident at all. These scores were summed across all 10 items to create a confidence score for each participant, where a lower score indicates greater fall prevention self-efficacy. At baseline, participants reported an average confidence score of 36.65 (SD=20.00), which improved significantly at 5 months, to 27.71 (SD=18.93) at 5 months.[428]

[427] T-Test for this reported change, $t(95)=6.45$, $p < .001$.

[428] T-test for this reported change, $t(186)=6.70$, $p < .001$

Lifelong

Survey of Consumer Experience

For evaluation of the LifeLong Complex Care Initiative (LCCI), NORC worked closely with LifeLong to develop and administer a telephone survey of LCCI participants that captures 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 focus on participant satisfaction, the effects of the intervention components on respondent's health, learned skills and goal setting/attainment, as well as demographics. Emphasis was placed on designing and testing questions that would be understood as expected by LCCI's target population of adults with disabilities and seniors. Questions were modified in the following ways:

- Response options were phrased using simplified language and design to improve comprehensibility (e.g. most questions were designed to elicit a "yes" or "no" response). The number of options and of questions asked per intervention component were limited.
- Examples were available to help clarify key terms and minimize confusion (e.g. providing examples of the type of "care" with which a participant may get help or a goal on which he/she may have worked).
- Simplified versions of questions were available when more complicated types of response formats, such as rating scales, were required (e.g. asking a respondent if something was "good" or "bad" to gauge satisfaction with care if he/she had difficulty responding to a question using a satisfaction rating scale).

Survey Administration. NORC launched the LCCI survey in May 2015 and completed it in June 2015. Surveys were administered by phone and responses were collected on hardcopy instruments. In addition, the LCCI 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). The awardee provided NORC with the names and contact information of 232 LifeLong participants through April 2015. This contact information was the basis of our sampling frame for the survey. After review of participant information provided in the file, participants were excluded because they were deceased or withdrawn due to moving out of the area (n=16), were duplicate records (n=6), were never enrolled or enrolled but never served (11), or were dis-enrolled from the program due to ineligibility (n=29). The survey population was further limited to participants who had an encounter with one of the LCCI intervention arms in the previous 12 months. Our final sample file included 122 LifeLong participants. 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). Of the 122 LifeLong participants included in the sample, 73 participants or proxy respondents completed either version of the survey. The overall response rate for the survey was 95 percent and 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, n=45). Due to the small contact frame and exclusion criteria, the overall response rate for the survey is high.

Data Analysis. Following electronic data entry of the hardcopy instrument responses, the analytic dataset was created including only completed interviews, defined as those with answers to all questions in the survey. Demographic information was analyzed for all survey respondents and data were further divided into three subgroups based on the program's main components, including 1) Nurse Care Manager care coordination 2) Peer Health Coach Sessions and 3) Living Well Workshops. Where possible, subgroups were further divided into those who utilized multiple components of LCCI's three-part program (multi-intervention) versus those who participated in a single component (single-intervention). We conduct 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" are excluded from data tables due to low frequency. Any data missing in error (e.g. items for which no response choice was marked on the survey hardcopy by the telephone interviewer), a negligible amount of the survey data, are included in the denominator when computing percentages.

In the following section, we present overall results of survey respondents and look more closely at each of LifeLong's main intervention components: care coordination facilitated by a Nurse Care Manager, Peer Health Coach sessions, and Living Well Workshops.

Descriptive Characteristics. Exhibit F.LCCI.1 presents demographic and other basic information for LifeLong participants who completed the survey. The distribution of enrolled (84 percent) to dis-enrolled (16 percent) survey respondents is similar to our sample file, with a majority of respondents actively engaged in the program. A slight majority of respondents (52 percent) are female, and about half are between 30 and 64 years old. Adults ages 65-74 make up eighteen (18) percent of the respondent population and those 75 and older, 12 percent. Forty (40) percent of respondents identify as Black or African American, those who identify as White comprise 14 percent of respondents and 18 percent report an "other" race. Thirty-two (32) percent are of Hispanic, Latino/a or Spanish origin. Educational attainment by degree level shows 64 percent of the sample have at least a high school education, with 40 percent having at least some college. Three-quarters of respondents report living independently and are about evenly split in terms of living situations, 47 percent live alone and 43 percent live with family. Low income characterizes the survey population, with 42 percent of respondents who live independently reporting a household income less than $15,000 per year. Overall, the diverse racial/ethnic make-up and socio-economic status of the survey respondents are representative of LCCI's target population of low income and underserved residents, helping to ensure findings will be representative of program participants as a whole.

Exhibit F.LCCI.1: Demographic Characteristics of LCCI Survey Respondents

Variable	Respondents % (N)
Number of Respondents	73
Enrollment Status in LifeLong Program	
Enrolled	83.6 (61)
Dis-enrolled	16.4 (12)
Gender	
Female	52.1 (38)
Male	31.5 (23)
Age Group	
Less than 30 years	1.4 (1)
30-54 years	21.9 (16)
55-64 years	30.1 (22)
65-74 years	17.8 (13)
≥75 years	12.3 (9)
Race	
White	13.7 (10)
Black or African American	39.7 (29)
Asian	1.4 (1)
Native Hawaiian or Other Pacific Islander	0.0 (0)
American Indian or Alaska Native	1.4 (1)
Other	17.8 (13)
Hispanic, Latino/a, or Spanish Origin	
Yes	31.5 (23)
Education	
Less Than High School	34.3 (25)
High School or GED	24.7 (18)
Some College or Less Than 4-Year Degree	24.7 (18)
College Graduate or 4-Year Degree	6.9 (5)
Post-Graduate Work or Advanced Degree	8.2 (6)
Living Situation	
Living Alone	46.6 (34)
Living with Family	42.5 (31)
Living with Friends	4.1 (3)
Other	5.5 (4)
Living Setting	
Independent	74.0 (54)
Assisted Living	4.1 (3)
Other	21.9 (16)
Household Income§	
Less than $15,000 per year	42.5 (31)
$15,000 to $24,999	6.9 (5)
$25,000 to $34,999	2.7 (2)
$35,000 to $49,999	1.4 (1)
$50,000 or greater	4.1 (3)
Prefer Not to Answer	5.5 (4)
Can't Remember/Don't Know	5.5 (4)
Personal Income§§	
Less than $15,000 per year	19.2 (14)
$15,000 to $24,999	1.4 (1)
$25,000 to $34,999	1.4 (1)
$35,000 to $49,999	0.0 (0)
$50,000 or greater	0.0 (0)
Prefer Not to Answer	2.7 (2)

NOTES: Responses of "Don't Know/Refused" have been excluded from table due to small numbers; for this reason, frequencies for any given variable may not sum to 100 percent. § Only asked of respondents who indicated that living independently (4 records were missing data on household income). §§ Only asked of respondents who indicated that living in assisted living or another congregate setting (1 record was missing data on personal income).

Exhibit F.LCCI.2 shows LCCI survey respondents' overall satisfaction with their nurse care manager, peer health coach, and/or Living Well Workshop (LWW) leader. Results represent consumer sub-groups limited by enrollment status (currently enrolled in LCCI) and utilization of the intervention (e.g. participants who did not have any encounters with a given intervention were excluded from counts). Across all three program components, a majority of respondents who utilized the intervention were "very satisfied" with the help they received. Although satisfaction among respondents who participated in peer support services is high, the proportion of respondents who are "very satisfied" (56 percent) is lower than the other intervention arms, as is the distribution between "very satisfied" and "satisfied." Open-ended responses capturing feedback on the peer coach intervention, reveal many respondents had a limited number of interactions with their peer health coach. This low frequency may influence the overall satisfaction with the intervention as participants may not have had time to see the type of support or progress expected. Additionally, the peer health coach intervention has the largest number of respondents (5 respondents) who did not rate their satisfaction (e.g. cases of 'Don't Know'/'Refused'). The absence of a rating may, again, be related to the number of interactions and the inclusion of these cases may change the distribution of responses. A negligible number of respondents report they are "dissatisfied" or "very dissatisfied" across all three groups.

Exhibit F.LCCI.2: Satisfaction with Nurse Care Manager, Peer Coach and LWW Leader

Variable	Nurse Care Manager (N=51)	Peer Health Coach (N=27)	LWW Leader (N=22)
Overall, how satisfied are you with the help you got from [name of intervention staff role]? % (N)			
Very Satisfied	82.4 (42)	55.6 (15)	77.3 (17)
Satisfied	15.7 (8)	25.9 (7)	9.1 (2)
Dissatisfied	0.0 (0)	0.0 (0)	4.6 (1)
Very Dissatisfied	2.0 (1)	0.0 (0)	0.0 (0)
Don't Know	0.0 (0)	14.8 (4)	4.6 (1)
Refused	0.0 (0)	3.7 (1)	4.6 (1)

Intervention: Nurse Care Manager. A majority of survey respondents (51 respondents) participated in the nurse care manager intervention. Given the number of respondents utilizing this program component, we were able to create two subgroups for further analysis and comparison: respondents who only utilized the nurse care management services (single intervention) vs. those who utilized peer coaching services and/or attended Living Well Workshops in addition to care management services (multi-intervention). Exhibit F.LCCI.2 displays respondents' assessments of their nurse care manager's impact on their health and health outcomes. Results are limited to respondents who have worked with a nurse care manager and compared by subgroup: single intervention vs. multi-intervention. Overall, a majority of respondents in both subgroups report their nurse care manager improving health outcomes. A vast majority of respondents in both subgroups felt their nurse care manager helped them have more control over their health care (87 percent single intervention; 93 percent multi-intervention) and most respondents felt they avoided bigger problems with their health, in part, because of the care management services (83 single intervention group; 79 percent multi-intervention). The most variance between the subgroups is found in respondents reporting their nurse care manager helped them take better care of themselves and go to the emergency department less frequently. A higher percentage (93 percent) of respondents in the multi-intervention subgroup report getting assistance to better care for themselves compared to the single

intervention group (70 percent). Sixty-eight (68) percent of the multi-intervention group report their nurse care manager helped reduce emergency department visits compared to 52 percent of the single intervention group.

Exhibit F.LCCI.3: Participant Health Outcomes

Variable	Single Intervention (N=23)	Multi-Intervention (N=28)	Total
Help you have more control over your health care % (N)			
Yes	87.0 (20)	92.9 (26)	90.2 (46)
Help you go to the ER less % (N)			
Yes	52.2 (12)	67.9 (19)	60.8 (31)
No	21.7 (5)	3.6 (1)	11.8 (6)
Not Applicable	26.1 (6)	14.3 (4)	19.6 (10)
Help you avoid bigger problems with your health % (N)			
Yes	82.6 (19)	78.6 (22)	80.4 (41)
Help you take better care of yourself % (N)			
Yes	69.6 (16)	92.9 (26)	82.4 (42)

NOTE: Responses of "Don't Know/Refused" have been excluded from table due to small numbers; for this reason, frequencies for any given variable may not sum to 100 percent.

Exhibit F.LCCI.4 displays respondents' assessments of assistance with care coordination and level of engagement with their nurse care manager. As previously noted, results are limited to respondents who have worked with a nurse care manager and compared by subgroup (single vs. multi-intervention). A vast majority of respondents in both subgroups report involvement in the management of their health and assistance in getting the care they need (this may include prescriptions, housing, and transportation). While overall views of involvement and coordination were positive, slightly more respondents in the multi-intervention group reported getting this type of support. Multi-intervention respondents unanimously (100 percent) reported their opinions were taken into account when seeking help compared to 91 percent of single intervention respondents. Both single and multi-intervention respondents overwhelmingly report being able to talk to their nurse care manager when needed (91 percent single intervention; 96 percent multi-intervention). The most variance between subgroups is seen in assessing access to care. Ninety-six (96) percent of multi-intervention respondents report it is easier to get the care they need since working with their nurse care manager compared to eighty-three (83) percent of single intervention respondents. It may be that respondents using multiple services are learning and acquiring new skills or attributing help they receive elsewhere to this measure, causing some of the difference in assessments between the subgroups.

Exhibit F.LCCI.4: Care Coordination and Participant Engagement

Variable	Single Intervention (N=23)	Multi-Intervention (N=28)	Total
Did working with [ ] make it easier to get the care you need? % (N)			
Yes	82.6 (19)	96.4 (27)	90.2 (46)
Did [ ] take your opinions into account while helping you? % (N)			
Yes	91.3 (21)	100.0 (28)	96.1 (49)
Were you able to talk to [ ] when you need him/her? % (N)			
Yes	91.3 (21)	96.4 (27)	94.1 (48)

NOTES: The survey instrument was tailored for each respondent, with the insertion of the name of their specific care manager inserted in place of the brackets noted above. Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any give variable may not sum to 100 percent.

Intervention: Peer Coach and Living Well Workshops. Peer health coaches provide Living Well Workshops and individual peer coaching to LifeLong participants. Some patients attended both workshops and individual peer sessions, where others only utilized one of the program components based on their current needs. One of the interdisciplinary functions of the peer health coach and Living Well Workshop classes is to provide knowledge and training to support community living and quality of life. When asked if working with a peer health coach or attending Living Well Workshops led to attainment of new skills, a majority of respondents who utilized peer coaching services (59 percent) and Living Well Workshops (64 percent) report having skills they did not have prior to joining the program, as shown in Exhibit F.LCCI.5. Open-ended responses from respondents provide insight into the types of skills acquired. Respondents report gaining self-motivation (e.g. feeling more confident in themselves and advocating for their needs), communication skills (e.g. being more social or getting a point across), and being able to better manage their health (e.g. having a better understanding of nutrition or managing depression). Respondents also mention assistance with technology education, in particular, learning computer skills to help them look for job opportunities and housing.

Exhibit F.LCCI.5: Acquired Skills

Variable	Peer Coach (N=22)	LWW (N=27)
Skills you have now that you didn't have prior to working with [name of intervention staff role] % (N)		
Yes	59.3 (16)	63.6 (14)
No	22.2 (6)	27.3 (6)

NOTE: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any give variable may not sum to 100 percent.

Peer coaching services and Living Well Workshops also offer support in client goal setting and attainment in an effort to advance self-direction and control over their health care. A goal orientation workshop is offered to supplement peer coaching that monitors progress towards identified goals. Exhibit F.LCCI.6 show respondents' assessment of their peer coach's support in this goal setting process if they identified a goal in the survey (n=24). Open-ended responses capturing goals identified by the respondent show common themes including: finding resources in the community (e.g. housing and employment), self-advocacy, decision making, and confidence building. Most respondents report their peer coach helped them make a plan (88 percent), find resources (83 percent) and figure out steps (92 percent) to reach their goal. Sixty-three (63 percent) report being asked their preferences when making a plan to reach their goal and 80 percent report their peer coach monitored their progress. Overall, respondents who

have worked with a peer coach express receiving support and assistance in reaching their goals. While most respondents report progress towards a goal with the help of a peer coach, they are almost evenly split on goal attainment: 33 percent reached their identified goal, 33 percent did not reach their goal, and 25 percent are still working on their goal.

Exhibit F.LCCI.6: Goal Identification and Attainment

Variable	Peer Coach % (N)
Ask you to come up with this goal	
Yes	45.8 (11)
No	45.8 (11)
Help you make a plan to reach this goal	
Yes	87.5 (21)
Help you figure out the steps to reach the goal	
Yes	91.7 (22)
Help you find resources to reach your goal	
Yes	83.3 (20)
Ask you what you liked or didn't like when making your plan	
Yes	62.5 (15)
Ask you how you are doing with your goal	
Yes	79.2 (19)
Did you reach that goal	
Yes	33.3 (8)
No	33.3 (8)
Partially/Almost There/Not Yet	25.0 (6)
Are you on track to reach it[1]	
Yes	62.5 (5)
No	25.0 (2)

NOTE: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100 percent. [1]Responses who did not reach their identified goal were asked this question.

Here, we present a subgroup analysis for 12 dis-enrolled program participants, for whom an additional three open-ended questions were asked, in addition to the survey items answered by all respondents. Following electronic data entry of the dis-enrolled hardcopy instrument responses, we reviewed the three open-ended items to identify commonalities and themes. The three questions asked respondents to describe (1) why they stopped working with their LifeLong providers, (2) what they liked about working with the providers, and (3) what they did not like about working with the providers. Eleven of the 12 dis-enrolled respondents answered all three questions, but the twelfth respondent did not answer any of the questions. Our analysis also draw on qualitative data gathered from recordings of the short phone surveys that are available for six dis-enrolled respondents.

Reasons for Dis-enrollment. The dis-enrolled LifeLong clients were overwhelmingly positive in their answers to the three questions and in the additional comments they made. The reasons given by respondents about why they stopped working with the LifeLong program fell into three main categories:

- The client needed a different type of provider, one who could offer a specific service that was not provided by their LifeLong provider (n=3). For example, after receiving psychiatric services, one client felt that this provider met his needs sufficiently and that he no longer required LifeLong's services.
- The client or LifeLong provider moved away and/or the service ended (n=4). In one case, the client moved away and had to dis-enroll. In another instance, a client's participation ended with the completion of her group program meetings.
- The client had scheduling conflicts (n=3). One of the respondents had many scheduling conflicts and never followed up with the program, while another had multiple surgical conflicts that led him to lose touch with his provider over time.

How Providers Helped Clients. Respondents described several ways that providers[i] helped them during their interactions.

- Offering greater access to care (n=3). One client was able to get in contact with his doctor and obtain medications more quickly by going through LifeLong. Another mentioned that it was useful to have their LifeLong provider as a "go-between" to reach people at the clinic or to help clients navigate their health care.
- Listening to clients problems and questions and finding solutions (n=7). Several clients mentioned that LifeLong providers were knowledgeable and able to answer their questions about various issues. Providers also helped to find solutions to problems, when needed. One client said that her provider helped her with her health insurance, while another client said that his provider would "attack a situation and will not let go until it's solved."
- Teaching techniques to clients that improve their quality of life (n=2). One client said that her provider taught her many things that have helped her live a better life, such as exercising daily. Another client mentioned that working with her LifeLong provider has given her the confidence to speak up and advocate on her own behalf.

From the answers and comments provided, it did not appear that any of the dis-enrolled respondents left due to dissatisfaction with the care they received from LifeLong. In fact, clients did not have any negative feedback, stating that there was nothing they did *not* like about working with their LifeLong providers. Some clients expanded upon these positive statements by describing their LifeLong providers as "kind, polite, and to the point" or "nice and very articulate."

Northland

Survey of Consumer 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 Exhibit F.NHA.1 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.

Exhibit F.NHA.1: 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 revisions. 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 NCCS participants. After review of participant information provided in the file, some participants were excluded from the survey sample file because they had died (n=65), were pretest respondents (n=4), or were missing contact information (n=3). Our final sample file includes 743 NCCS participants. Data collection for the Northland survey began in May 2015 and was completed in August 2015. A total of 373 surveys were completed, with 294 from enrolled participants and 79 from dis-enrolled participants. The overall response rate for the survey was 70 percent and was calculated using eligible respondents with correct contact information who completed the entire survey by phone or on paper; respondents with incorrect contact information discovered during data collection were excluded from the count of eligible respondents, as were Northland participants without any contact information provided prior to data collection.

Data Analysis. In September 2015, data were electronically entered for all paper surveys and then merged with survey data collected by phone, so that the resulting analytic dataset includes all NCCS survey data across both modes (phone and paper). Incomplete surveys, defined as those without answers to all questions in the survey, were excluded from the analytic dataset. Data were reviewed for completeness and to identify missing, invalid, skip logic errors, or out-of-range values, and open-ended responses were reviewed for common themes and to supplement quantitative data analysis. Response options of "Don't Know/Refused" were excluded from data tables due to low frequency. Any data missing in error, a negligible amount of the survey data, were included in the denominator when computing percentages.

In the following section, we present a demographic profile of survey respondents and their overall satisfaction with, and perception of, the NCCS program. We then look more closely at several survey domains (specified in F.NHA.1), focusing on participant experience with the NCCS program as it relates to access to health care and human services, support for goals, and participant autonomy and self-management.

Exhibit F.NHA.2 presents demographic and other information about NCCS survey respondents. The distribution of enrolled (79 percent) to dis-enrolled (21 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 (67 percent) are female, and

most are at least 75 years old (78 percent). Almost all (97 percent) identify as White, with about 2 percent identifying as American Indian or Alaska Native. The sample is educated, with 74 percent having at least a high school education and 39 percent having at least some college. Most NCCS respondents live alone (51 percent), with another 40 percent living with a spouse or partner. Sixty-seven (67) percent have a family member or friend help manage their health or health care. Of those providing an annual household income (N=290), 48 percent earn less than $24,999, with only 4 percent earning $50,000 or more. NCCS does not have any income criteria for program eligibility, allowing older adults with diverse financial situations to participate in the program.

Results from both the phone survey and the paper version were similarly representative of the population Northland serves: most survey respondents are female, 75 years or older, and identify as White (with a small number identifying as American Indian or Alaska Native). Our survey of dis-enrolled participants consists of a single open-ended question asking for the reason they were no longer enrolled in NCCS.

Exhibit F.NHA.2: Demographic Characteristics of NCCS Survey Respondents

Variable	Respondents % (N)	
Number of Respondents	373	
Enrollment Status in NCCS Program		
Enrolled	78.8 (294)	
Dis-enrolled	21.2 (79)	
Survey Mode	**Enrolled**	**Dis-enrolled**
Phone	93.5 (275)	96.2 (76)
Paper	6.5 (19)	3.8 (3)
Gender		
Female	67.0 (250)	
Age Group§		
30-54 years	0.0 (0)	
55-64 years	4.3 (16)	
65-74 years	18.0 (67)	
≥75 years	77.7 (289)	
Race§		
White	96.5 (360)	
Black or African American	0.3 (1)	
American Indian or Alaska Native	1.9 (7)	
Other	0.3 (1)	
Education§§		
Less Than High School	25.2 (74)	
High School or GED	35.4 (104)	
Some College or Less Than 4-Year Degree	29.3 (86)	
College Graduate or 4-Year Degree	5.8 (17)	
Post-Graduate Work or Advanced Degree	4.1 (12)	
Current Living Situation§§		
Living Alone	51.2 (150)	
Living with Spouse/Partner	39.8 (117)	
Living with Family	6.5 (19)	
Other	2.7 (8)	
Household Income§§		
Less than $15,000 per year	26.9 (79)	
$15,000 to $24,999	20.8 (61)	
$25,000 to $34,999	9.2 (27)	
$35,000 to $49,999	6.5 (19)	
$50,000 or greater	4.4 (13)	
Can't Remember/Don't Know	18.4 (54)	
Refused	12.6 (37)	
Informal Caregiver Helps Manage Health or Health Care§§		
Yes	67.4 (198)	
No	32.0 (94)	

NOTES: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any given variable may not sum to 100 percent. § Data on race and birth year were provided by Northland and are missing for a small number of cases (four records missing race and two records missing birth year). §§ Not asked of dis-enrolled participants (N=79).

Exhibit F.NHA.3 summarizes respondents' views on how the NCCS community care coordinators have affected access to health care and human services, an integral component of the intervention. Nearly all respondents (93 percent) report talking with their care coordinator when needed. Mirroring positive feedback in other survey domains, most respondents "agree" or "strongly agree" their care coordinator helps to manage different aspects of their care, including connecting them to needed services, which might include Lifeline (Medical Alert), social services or financial resources for medications (90 percent), and providing assistance in getting referrals to various health care providers (79 percent).

To measure access to health care and human services, respondents were asked a series of questions about specific health-related or services-related aspects of care with which they may need assistance; Exhibit F.NHA.3 displays the results. If respondents did not receive help in a certain area, they were asked if help were needed. Across all measures, very few respondents reported needing help if they were not already receiving it. Findings indicate that:

- Areas with the least reported assistance from care coordinators include coordinating with doctors/hospital on discharge plans (69 percent), help with meals (such as Meals on Wheels) (67 percent), and appointment scheduling and reminders (59 percent).
- Areas with the most reported assistance include making the respondent feel safe and more independent in their home (76 percent) and learning health management techniques (66 percent).

Exhibit F.NHA.3: Access to Health Care and Human Services

Variable	Respondents % (N)	Where response = no, did respondent note that s/he needed help with this task?
Talk with Care Coordinator as often as you need		
Yes	92.9 (273)	
Care Coordinator tries to connect me with the services that I need		
Strongly Agree	33.3 (98)	
Agree	56.5 (166)	
Disagree	4.4 (13)	
Strongly Disagree	0.7 (2)	
Care Coordinator helps me get referrals to new doctors, therapists, or area agencies, if I need them		
Strongly Agree	29.9 (88)	
Agree	49.3 (145)	
Disagree	9.9 (29)	
Strongly Disagree	2.0 (6)	
I am supported in arranging for the services and/or supports that I need		
Strongly Agree	36.7 (108)	
Agree	58.8 (173)	
Disagree	3.7 (11)	
Care Coordinator helped you prepare for doctor visits		
Yes	41.2 (121)	
No	54.4 (160)	6.9 (11)
Care Coordinator helped you coordinate with doctors and hospital on discharge plans		
Yes	26.9 (79)	
No	68.7 (202)	5.5 (11)
Care Coordinator helped you make a written plan for your health called "Managing my Health"		
Yes	51.7 (152)	
No	37.4 (110)	11.8 (13)
Care Coordinator helped you get help with meals, such as arranging for Meals on Wheels		
Yes	30.6 (90)	
No	67.4 (198)	3 (6)
Care Coordinator helped teach you how to better manage your own health		
Yes	66.0 (194)	
No	31.3 (92)	3.3 (3)
Care Coordinator helped you make or remember appointments with your health care provider		
Yes	38.1 (112)	
No	59.2 (174)	2.3 (4)
Care Coordinator helped make you feel safer and more independent in your home		
Yes	76.2 (224)	
No	21.8 (64)	3.1 (2)

NOTES: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any give variable may not sum to 100 percent.

Goal setting and attainment comprises another key aspect of the Northland intervention. About one-third of respondents (33 percent) set one or more specific goals to manage their health, as seen in Exhibit F.NHA.4, most of whom (89 percent) report ongoing work to reach these goals and "agree" (59 percent) or "strongly agree" (28 percent) they are making progress towards goal attainment. Open-ended responses regarding goal setting show most respondents focused on a physical health goal, such as exercising more. Given the overall high levels of satisfaction and positive feedback for the program, it does not appear that the modest frequency of reported goal setting has affected respondents' experience or benefits from the program, although the percentage of those working towards a goal was expected to be higher.

Exhibit F.NHA.4: Patient Autonomy, Self-Determination, Intervention Support for Patient Goals

Variable	Respondents % (N)
Set one or more specific goals to manage health	
Yes	33.0 (97)
No	53.4 (157)
Still working on goals	
Yes	88.9 (88)
No	8.1 (8)
I am making progress towards this goal	
Strongly Agree	28.4 (25)
Agree	59.1 (52)
Disagree	4.6 (4)
Strongly Disagree	1.1 (1)

NOTES: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any give variable may not sum to 100 percent.

Exhibit F.NHA.5 displays respondents' self-assessment of functioning and health. Although most respondents are older adults (≥75 years), less than a quarter report difficulty dressing/bathing (22 percent) and 36 percent report serious cognitive impairments (difficulty remembering or making decisions). The most variance is found in the number of respondents reporting difficulty with mobility, with 57 percent of respondents reporting difficulty walking or climbing stairs compared to 43 percent reporting no serious difficulty. Assessing differences by demographics (e.g. gender and education) show male respondents reported difficulty dressing or bathing at a higher rate (30 percent) than do their female comparators (18 percent). Differences by education level are negligible and show little influence on reported functional status.

Exhibit F.NHA.5: Patient Health Limitations and Functional Status

Variable	Respondents % (N)
Serious Difficulty Walking or Climbing Stairs	
Yes	56.8 (167)
No	42.9 (126)
Difficulty either dressing or bathing	
Yes	22.1 (65)
No	77.6 (228)
Serious Difficulty Concentrating, Remembering, or Making Decisions	
Yes	36.4 (107)
No	62.9 (185)

NOTE: Responses of "Don't Know/Refused/Not Applicable" have been excluded from table due to small numbers; for this reason, frequencies for any give variable may not sum to 100 percent.

Currently, there are no fees associated with participating in the NCCS program. Respondents were asked about the maximum monthly amount they would be willing to pay for the program, in an effort to gauge prospects for sustainability if fees were to be implemented. The survey question was designed to elicit an open-ended response, allowing the respondent to give any numerical value. If a response of "Don't

Know" was given, pay ranges were offered to assist the respondent in answering the question. All responses, as presented in Exhibit F.NHA.6, were categorized into the pay ranges for this report. Interestingly, even after being offered pay categories, 35 respondents maintained an answer of "Don't Know" and did not choose a value range. Of those who reported a maximum amount, there is no clear majority. Thirty-three (33) percent of respondents would not participate in the program if there were costs associated with it. Excluding the $30-$39 pay range, there is little variance between the rest of the ranges.

Exhibit F.NHA.6: Maximum Monthly Willingness to Pay for the NCCS Program

Variable	Respondents % (N)
Most you would be willing to pay per month for the program	
Would not participate if the program wasn't free	32.7 (96)
Less than $10 per month	14.0 (41)
$10-$19 per month	11.9 (35)
$20-$29 per month	12.9 (38)
$30-$39 per month	2.7 (8)
$40 or more per month	10.9 (32)
Don't Know	11.9 (35)
Refused	1.7 (5)

In the following section, we look more closely at participation and experience with care coordination, medication management, patient-provider relationships, and experiences of informal (unpaid family) caregivers with the intervention. Our discussion of these domains reflects enrolled participants' survey data (n=294). We also present and discuss the open-ended responses of dis-enrolled participants.

Care Coordination. Exhibit F.NHA.7 displays respondents' assessments of their experiences and relationship with their care coordinator, an integral component of the NCCS program. Respondents generally describe supportive relationships and patient-centered communication. Almost all (96 percent) reported a good working relationship with their care coordinator and responded positively ("agree" or "strongly agree") when asked to value various aspects of care coordination engagement including:

- being treated with respect (99 percent),
- being offered an explanation in a way that is easy to understand (98 percent), and
- the sense that the coordinator is informed about all home-based care (87 percent) and care received from the client's physician (85 percent)[429]

While most respondents did not have suggestions for improving care coordination when asked if there was something their care coordinator could be more helpful with, the most common suggestion, captured in open-ended responses, was more frequent visits and check-ins.

[429] Percents represent the number of respondents who "agree" or "strongly agree" with the statement.

Exhibit F.NHA.7: NCCS Survey: Participation and Experience with Care Coordinator

Variable	% Respondents (N)
Number of Respondents	**N=294**
Care coordinator seems informed about all the care I get from my doctors (N=279)	
Strongly Agree	28.6 (84)
Agree	56.5 (166)
Disagree	8.8 (26)
Strongly Disagree	1.0 (3)
Care coordinator seems informed about all the care I get at home (N=280)	
Strongly Agree	30.6 (90)
Agree	56.5 (166)
Disagree	6.8 (20)
Strongly Disagree	1.4 (4)
Care coordinator explains things in a way that is easy to understand (N=293)	
Strongly Agree	41.2 (121)
Agree	56.5 (166)
Disagree	1.4 (4)
Strongly Disagree	0.7 (2)
Care coordinator treats me with respect (N=293)	
Strongly Agree	54.1 (159)
Agree	44.6 (131)
Disagree	0.7 (2)
Strongly Disagree	0.3 (1)
Have a good working relationship with care coordinator (N=291)	
Strongly Agree	41.5 (122)
Agree	54.8 (161)
Disagree	1.7 (5)
Strongly Disagree	1.0 (3)
Care coordinator takes my opinions into account when creating "Managing My Health" form (N=280)	
Strongly Agree	38.1 (112)
Agree	51.0 (150)
Disagree	5.8 (17)
Strongly Disagree	0.3 (1)
Care coordinator asked if there are things that make it hard to take care of your health (N=271)	
Yes	54.1 (159)
No	38.1 (112)

NOTES: Responses of Don't Know/Refused/Not Applicable have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100 percent.

Medication Management. Exhibit F.NHA.8 presents findings related to medication management, based on a respondent's most recent visit with his/her care coordinator. A majority of respondents (64 percent) reported talking about some or all of their medications in this visit while 28 percent reported that they did not discuss medications. For those who reported not discussing medication during their most recent visit, it is possible these discussions occurred at other visits or times not captured in the survey. Of those who discussed prescription and over-the-counter medicines, three-quarters reported talking about the purpose for taking some or all of these medications, and roughly half (51 percent) reported discussing how to take

these medications, which may facilitate appropriate use and dosage. Overall, respondents who discussed medications with their care coordinator found these conversations helpful (67 percent) and had their questions addressed (69 percent).

Exhibit F.NHA.8: NCCS Survey: Medication Management

Variable	% Respondents (N)
Number of Respondents	N=282
Talk about all the prescription and over-the-counter medicines you were taking	
Talk about all of your medications	46.6 (137)
Talk about some of your medications	17.7 (52)
Not talk about your medications	28.2 (83)
Do not have any medications	3.4 (10)
Talk about the purpose for taking each of your medicines	
Talk about each	54.0 (102)
Talk about some	21.2 (40)
Did not talk about this	20.6 (39)
Talk about how to take each of these medicines	
Talk about each	37.6 (71)
Talk about some	13.8 (26)
Did not talk about this	42.9 (81)
How helpful were these conversations to you	
Very Helpful	67.2 (127)
Somewhat Helpful	27.5 (52)
Not at all Helpful	3.2 (6)
Did care coordinator follow-up to answer questions you had about these medicines	
Yes	68.8 (130)
No	9.0 (17)
I did not have any questions	19.6 (37)

NOTE: Responses of Don't Know/Refused/Not Applicable have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100 percent.

Relationship with Providers. Exhibit F.NHA.9 displays respondents' assessment of their relationship with providers, which can include doctors, nurses, or physician assistants. A majority of respondents (74 percent) reported improved communication with their providers since enrolling in the NCCS program. This improvement may help participants better understand their health care needs and help support the high levels of involvement and control in health management reported in the survey (findings presented in the eighth quarterly report).

In addition, Exhibit F.NHA.9 shows self-reported frequencies of emergency room visits since enrollment. When asked if their emergency room visits increased, decreased, or stayed the same since enrollment in NCCS:

- Nearly half (46 percent) of the respondents responded the question was not applicable (e.g., respondents did not go to the emergency room);
- Twenty-six (26) percent reported visiting the emergency room about the same amount as they did prior to enrolling;
- Twenty-one (21) percent reported a decrease in visits; and

- Two (2) percent of respondents noted an increase.

Responses to emergency department utilization may be affected by the length of time a respondent has been enrolled in the NCCS program, making it difficult to gauge a change in utilization or attribute it to the program in some way. Review of open-ended responses capturing reasons for a decrease in emergency room visits, for those who reported one, show many respondents reported "feeling better" and taking better care of themselves. For the small number of respondents who reported an increase in emergency room visits, open-ended responses capturing reasons for this increase describe acute issues such as the possibility of having a stroke or pneumonia.

Exhibit F.NHA.9: NCCS Survey: Relationship with Providers

Variable	Respondents % (N)
Are you able to communicate better with your providers about your health (N=273)	
Yes	74.2 (218)
No	18.7 (55)
Have you visited the emergency room less than, about the same, or more than you did before enrolling in the program (N=280)	
Less Than	21.4 (63)
About the Same	25.9 (76)
More Than	2.4 (7)
Does Not Apply	45.6 (134)

NOTES: Responses of Don't Know/Refused/Not Applicable have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100%.

Informal Caregiver Experience. For those NCCS participants who were unable to complete the survey on their own, proxy respondents (likely a family member or informal caregiver) were encouraged to help the participant complete the survey or complete the survey on the participant's behalf (n=31). Exhibit F.NHA.10 shows proxy respondents' assessments of their own caregiving experiences with the NCCS participant. The vast majority of proxies were:

- Either a spouse or child of the NCCS participant (48 and 39 percent, respectively),
- Live in the same household as the participant (61 percent), and
- Provided care to the participant for two years or longer (81 percent).

On average, proxy respondents reported spending 52 hours per week providing care. Sixty-one (61) percent of proxy respondents completed the survey on the NCCS participant's behalf and roughly a quarter (23 percent) read the questions verbatim, having the NCCS participant answer them. The remaining proxy respondents explained the survey text to a certain degree to help the NCCS participant understand and respond to the questions.

The survey asked informal caregivers to assess whether the NCCS program affected communication, care coordination, and stress and strain that may come from caring for the NCCS participant. A majority of informal caregivers (77 percent) attribute the NCCS program with helping them coordinate the care of the NCCS participant more easily. Sixty-one (61) percent of respondents "strongly agree" (16 percent) or "agree" (45 percent) that communication with the NCCS participant improved since enrollment. Most respondents report that levels of physical strain, emotional stress, and financial hardship remained the

same since enrolling: 52 percent reported the same level of physical strain, 42 percent reported the same level of emotional stress, and 77 percent reported the same level of financial hardship. The least amount of reported change is found in levels of financial hardship, with only 16 percent of respondents reporting an increase or decrease. The most change is reported in emotional stress levels, with 32 percent of respondents reporting less stress and 19 percent reporting more emotional stress since enrollment.

Exhibit F.NHA.10: NCCS Survey: Experiences of Informal Caregivers

Variable	Respondents % (N), unless otherwise noted
Relationship to Northland participant (N=31)	
Spouse	48.4 (15)
Child	38.7 (12)
Other Relative	3.2 (1)
Friend	3.2 (1)
Other	6.5 (2)
Live in the same household as Northland participant (N=31)	
Yes	61.3 (19)
No	38.7 (12)
How long have you been providing care to Northland participant (N=31)	
More than six months but less than a year	3.2 (1)
More than a year but less than two years	9.7 (3)
Two years or longer	80.7 (25)
Can't Remember/Don't Know	6.5 (2)
Hours spent in an average week providing care for Northland participant (N=21)	
Mean Hours	52 (21)
Because of the NCCS program, communication between me and the Northland participant improved (N=30)	
Strongly Agree	16.1 (5)
Agree	45.2 (14)
Disagree	25.8 (8)
Strongly Disagree	3.2 (1)
Can't Remember/Don't Know	6.5 (2)
Has there been more, less, or about the same amount of physical strain of caring for the Northland participant (N=29)	
More Strain	12.9 (4)
Less Strain	29.0 (9)
About the Same	51.6 (16)
Has there been more, less, or about the same amount of emotional stress of caring for the Northland participant (N=29)	
More Stress	19.4 (6)
Less Stress	32.3 (10)
About the Same	41.9 (13)
Has there been more, less, or about the same amount of financial hardship of caring for the Northland participant (N=29)	
More Hardship	9.7 (3)
Less Hardship	6.5 (2)
About the Same	77.4 (24)
Has NCCS helped you coordinate the care of the Northland participant more easily (N=30)	
Yes	77.4 (24)
No	16.1 (5)
Can't Remember/Don't Know	3.2 (1)

NOTE: Responses of Don't Know/Refused/Not Applicable have been excluded from table due to small numbers, and as such, frequencies for any give variable may not sum to 100 percent.

Enrollment and Dis-Enrollment. Enrolled participants (n=294) were asked to give their most important reason for deciding to participate in the program. For surveys completed over the phone, respondents' answers were categorized into one of the response categories shown in Exhibit F.NHA.11. No particular response predominates among those that could be categorized, other than a small number of respondents who gave as explanations an interest in either free services or avoiding a return to the hospital. Of those who gave an answer that could not be categorized, as well as respondents who completed a paper version of the survey, common reasons for participation included: support (e.g. someone to visit, someone to give advice), security and safety (e.g. home modifications, medical equipment such as bath chairs or grab bars), and better care management (e.g. connecting to services such as LifeLine Medical Alert).

Exhibit F.NHA.11: NCCS Survey: Reasons for Enrollment

Variable	Respondents % (N)
Number of Respondents	**N=267**
Most important reason you decided to participate in the program	
Referral by health care provider or caregiver	8.2 (24)
Interest in learning more about improving their health	13.6 (40)
Interest in avoiding a return to the hospital	2.7 (8)
Needed help identifying the best place to go for the care they needed	10.5 (31)
Family member wanted them to enroll	7.1 (21)
Live independently in home	7.8 (23)
Services were free	0.3 (1)
Other	40.5 (119)

Our survey of dis-enrolled participants consisted of a single open-ended question asking for the reason that a participant was no longer enrolled in the Northland program (n=79). Open-ended responses capturing reasons for dis-enrollment show common themes, including: relocation to a nursing home or assisted living facility where care is provided; that the services and care the program offered were not needed or did not fit needs; or dissatisfaction with the program (and a small number of respondents reported dissatisfaction with the program. Interestingly, roughly half of the dis-enrolled participants who completed the survey did not give a reason for no longer participating, either stating they couldn't remember the program or the reason for leaving.

Palliative Care Consultants of Santa Barbara

Survey of Consumer Experience

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. See Exhibit F.PCCSB.1 for a summary of domains and survey questions. A shorter survey was administered to DASH patients who were no longer enrolled in the program to elicit reasons for disenrollment.

Exhibit F.PCCSB.1: Summary of DASH Survey Domains and Questions

Domain	Description
Enrollment Process	When you first enrolled in DASH, did anyone from DASH talk with you about your health history, including your current health conditions?
Participation & Experience with DASH	If I need it, I can get in touch with someone from DASH quickly. Do you strongly agree, agree, disagree, or strongly disagree?
Patient Autonomy, Self-Determination, Intervention Support for Patient Goals	DASH takes my wishes into account when helping me set my goals of care. Do you strongly agree, agree, disagree, or strongly disagree?
Patient and Caregiver Satisfaction	Overall, how satisfied are you with the DASH program?
Experience of Informal (unpaid family) Caregiver with Intervention	Has DASH helped you to coordinate the care of [the DASH participant] more easily?
Functional status	Do you have serious difficulty with any of the following: concentrating, remembering, or making decisions?
Perceived value of DASH	If you pay the $60 subscription fee for the DASH program (or $90 for couples), is the program a good value for that fee?

Survey Administration. NORC launched the DASH survey in May 2015 and completed it in September 2015. The survey was designed as a self-administered paper survey, with English and Spanish versions, and could be completed with the help of a friend or family member (i.e., proxy). The survey captured any assistance provided by a proxy respondent and included a series of questions directed at the proxy to measure their own caregiving experiences with the DASH patient (i.e., Experience of Informal Caregiver survey domain).

In May 2015, PCCSB provided the names and contact information, as well as several demographic characteristics (e.g. age, race/ethnicity and gender), for 1,330 DASH patients. This contact information was the basis of our sampling frame for the survey. After review of patient information provided in the file, a portion of patients were excluded from the survey sample file because they were duplicate records (n=59) or withdrawn due to moving out of the country (n=1). Our final sample file included 1,270 DASH patients. Among these patients, those whom DASH classified as actively enrolled (1,080) were mailed a more comprehensive version of the survey (enrolled), while those patients whom DASH did not classify as actively enrolled in the program (190) were mailed an abbreviated version of the survey (disenrolled). In mid-August 2015, a postcard reminder was sent to DASH patients who had not yet returned a survey to encourage their participation. A total of 398 enrolled and dis-enrolled surveys were completed by patients or proxy respondents and returned to NORC. The overall response rate for the survey was 32 percent and 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).

Data Analysis. In October 2015, data were electronically entered for all surveys. Data were reviewed for completeness and to identify missing, invalid, skip logic errors, or out-of-range values, and open-ended responses were reviewed for common themes and to supplement quantitative data analysis. Response options of "Don't Know/Refused" are not presented in the data tables due to low frequency. When item

non-response exceeded five percent of the total number of responses, these data were excluded when computing percentages.

In the following section, we present a demographic profile of survey respondents and begin to explore a subset of survey domains specified in F.PCCSB.1, focusing on advanced care planning discussed during DASH enrollment visits. Findings based on analysis of additional survey domains will be presented in our next quarterly report to CMMI (Q9).

Exhibit F.PCCSB.2 summarizes demographic and other information about DASH survey respondents. The distribution of enrolled (90 percent) to disenrolled (10 percent) survey respondents is similar to that in our sample file, with a majority of respondents currently enrolled in the program. Roughly three-quarters of respondents are at least 75 years old (77 percent), with 21 percent 65-74 years of age and 2 percent under 64 years. Most respondents (71 percent) are female, and most (89 percent) identify as White, with a small number identifying as Asian (2 percent) or African American (1 percent). Eight percent of respondents identify as Hispanic or Latino/a. The sample is educated; a majority of respondents (93 percent) have at least a high school education and 76 percent have at least some college. Most DASH respondents live alone (63 percent), with another 23 percent living with a spouse or partner. Almost all (91 percent) live independently or in an independent senior living setting. Of those providing an annual household income (N=304), half (51 percent) earn less than $24,999, with an additional 12 percent earning $50,000 or more. Overall, we understand the sample to be representative of the DASH program's target population, helping to ensure that findings will be representative of program participants as a whole. Most respondents are ages 60 or older and live independently or in independent senior living.

Our survey of dis-enrolled participants consists of a single open-ended question asking for the reason they were no longer enrolled in the DASH program. Review and discussion of these open-ended responses will be included in our next quarterly report to CMMI (Q9). Unless otherwise noted, the discussion in this report is based on the survey responses of enrolled participants (N=358).

Exhibit F.PCCSB.2: Demographic Characteristics of PCCSB Survey Respondents

Variable	Respondents % (N)
Number of Respondents	398
Enrollment Status in DASH (N=398)	
Enrolled	90.0 (358)
Dis-enrolled	10.1 (40)
Gender (N=398)	
Female	71.4 (284)
Age Group (N=398)	
55-64 years	1.8 (7)
65-74 years	21.4 (85)
≥75 years	76.9 (306)
Race and Ethnicity[3] (N=397)	
White	88.9 (354)
African American	1.0 (4)
Hispanic or Latino/a	7.5 (30)
Asian	2.3 (9)
Education[1,2] (N=335)	
Less Than High School	7.2 (24)
High School or GED	17.0 (57)
Some College or Less Than 4-Year Degree	35.8 (120)
College Graduate or 4-Year Degree	17.0 (57)
Post-Graduate Work or Advanced Degree	23.0 (77)
Current Living Situation[1,2] (N=332)	
Living Alone	63.3 (210)
Living with Spouse/Partner	22.9 (76)
Living with Family	6.9 (23)
Living with Friends	1.2 (4)
Other	5.7 (19)
Living Setting[1,2] (N=339)	
Independent	45.1 (151)
Independent Senior Living	45.7 (157)
Assisted Living (Includes Board & Care)	6.6 (22)
Other	2.7 (9)
Household Income[2,4] (N=304)	
Less than $15,000 per year	29.0 (88)
$15,000 to $24,999	22.4 (68)
$25,000 to $34,999	7.2 (22)
$35,000 to $49,999	3.0 (9)
$50,000 or greater	11.8 (36)
Prefer Not to Answer	21.7 (66)
Personal Income[1,2,5] (N=24)	
Less than $15,000 per year	12.5 (3)
$15,000 to $24,999	20.8 (5)
$25,000 to $34,999	4.2 (1)
$35,000 to $49,999	12.5 (3)
$50,000 or greater	20.8 (5)
Prefer Not to Answer	29.2 (7)

NOTES: Missing data under a 5 percent threshold were kept; for this reason, frequencies for any given variable may not sum to the total. [1] Missing data exceeded a 5 percent threshold, so null records are dropped from the denominator. [2] Not asked of dis-enrolled participants (N=40). [3] Race was provided by PCCSB and was missing for 1 case. Race and ethnicity (Hispanic or Latino/a) was reported in a single variable by PCCSB, this breakdown is reflected in the table. [4] Only asked of those who indicated living independently or in independent senior living (15 records missing household income). [5] Only asked of those who indicated living in assisted living or another congregate setting.

As part of the enrollment visit, DASH patients may discuss advance care planning and end-of-life decisions with an intake specialist. Exhibit F.PCCSB.3 presents respondents' feedback on this aspect of

enrollment. Of those who responded to the survey question, a majority (80 percent) report discussing the Physician Orders for Life-Sustaining Treatment (POLST) form during the DASH enrollment visit. Among these respondents who recall the POLST discussion at enrollment, 80 percent have had conversations with a family member or friend regarding treatment options and goals of care related to the POLST form. Whether or not respondents recall the POLST enrollment discussion, most respondents believes that they have the information needed to make decisions about POLST (92 percent 'strongly agree' or 'agree'), and most respondents (76 percent) have completed the POLST form. Of those who have not completed the form, 25 percent report feeling they did not have to make these advanced care planning decisions yet as the reason for not completing the form; another 11 percent report that these kinds of decisions were too hard to make. An additional 34 percent of respondents give alternative reasons, captured in open-ended responses, for not completing the POLST form. A review of these responses show many respondents completed other advance care planning forms, including the Five Wishes advance directive form, and did not feel completing the POLST was necessary.

Exhibit F.PCCSB.3: Advance Directives and Care Choices

Variable	Respondents % (N)
Did anyone from DASH talk to you about The Physician Orders for Life-Sustaining Treatment (POLST)? [1] (N=309)	
Yes	80.3 (248)
Did you talk about options on the POLST form with someone who knows you such as a family member or friend? [2] (N=248)	
Yes	79.8 (198)
Have you completed the POLST form? [1] (N=303)	
Yes	75.9 (230)
No	16.5 (50)
What is the main reason you haven't completed the POLST form? [1,3] (N=44)	
I forgot	9.1 (4)
Too much paperwork	4.6 (2)
Too hard to make these kinds of decisions	11.4 (5)
I want to talk to a physician about these decisions	6.8 (3)
I want to talk to family and friends about these decisions	6.8 (3)
My family and I do not agree on these decisions	2.3 (1)
I do not feel like I need to make these decisions yet	25.0 (11)
Other	34.1 (15)
I have the information I need to make decisions about POLST [1] (N=297)	
Strongly Agree	52.2 (155)
Agree	39.7 (118)
Disagree	6.1 (18)
Strongly Disagree	2.0 (6)

NOTES: [1] Missing data exceeded 5% threshold, null records dropped from denominator. [2] Only asked of respondents who reported talking about the POLST form with DASH team (n=248). [3] Only asked of respondents who had not completed the POLST (N=44).

In this next section, we discuss survey data 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. See Exhibit F.PCCSB.4 for a summary of domains and survey questions. A shorter survey was administered to DASH patients who were no longer enrolled in the program to elicit reasons for disenrollment, and these data are also presented.

Exhibit F.PCCSB.4: DASH Survey: Summary of Domains and Questions

Domain	Description
Functional status	Do you have serious difficulty with any of the following: concentrating, remembering, or making decisions?
Enrollment Process	When you first enrolled in DASH, did anyone from DASH talk with you about your health history, including your current health conditions?
Participation & Experience with DASH	If I need it, I can get in touch with someone from DASH quickly. Do you strongly agree, agree, disagree, or strongly disagree?
Patient Autonomy, Self-Determination, Intervention Support for Patient Goals	DASH takes my wishes into account when helping me set my goals of care. Do you strongly agree, agree, disagree, or strongly disagree?
Patient and Caregiver Satisfaction	Overall, how satisfied are you with the DASH program?
Experience of Informal (unpaid family) Caregiver with Intervention	Has DASH helped you to coordinate the care of [the DASH participant] more easily?
Functional status	D
Perceived value of DASH	If you pay the $60 subscription fee for the DASH program (or $90 for couples), is the program a good value for that fee?

Survey Administration. NORC launched the DASH survey in May 2015 and analyzed the survey findings in September 2015. The survey was designed as a self-administered paper survey, with English and Spanish versions, and could be completed with the help of a friend or family member (i.e., proxy). The survey captured any assistance provided by a proxy respondent and included a series of questions directed at the proxy to measure their own caregiving experiences with the DASH patient (i.e., Experience of Informal Caregiver survey domain).

Our final sample file included 1,270 DASH patients. Among these patients, those whom DASH classified as actively enrolled (1,080) were mailed a more comprehensive version of the survey (enrolled), while those patients whom DASH did not classify as actively enrolled in the program (190) were mailed an abbreviated version of the survey (dis-enrolled). A total of 398 enrolled and dis-enrolled surveys were completed by patients or proxy respondents and returned to NORC; 11 surveys were completed in Spanish. The overall response rate for the survey was 32 percent and 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).

Data Analysis. In October 2015, data were electronically entered for all surveys. Data were reviewed for completeness and to identify missing, invalid, skip logic errors, or out-of-range values, and open-ended responses were reviewed for common themes and to supplement quantitative data analysis. Response options of "Don't Know/Refused" are not presented in the data tables due to low frequency. When item non-response exceeded five percent of the total number of responses, these data were excluded when computing percentages.

Functional Status. We asked survey respondents to report on their functional health to develop a limited health profile and provide context for their responses. Based on the three questions presented below in Exhibit F.PCCSB.5, the participants surveyed appear to have a moderate level of functional impairment. Of the functional health activities listed, mobility challenges the most respondents, with nearly half (46 percent) reporting serious difficulty with walking or climbing stairs. Only 29 percent of respondents report cognitive difficulties, such as trouble concentrating or remembering.

Exhibit PCCSB.5: DASH Survey: Self-Reported Functional Status

Variable	Respondents % (n)
Do you have serious difficulty either walking or climbing stairs?[1]	**N=334**
Yes	45.5 (152)
No	54.5 (182)
Do you have difficulty either dressing or bathing? (N=358)	
Yes	24.9 (89)
No	72.1 (258)
Do you have serious difficulty with any of the following: concentrating, remembering, or making decisions? (N=358)	
Yes	28.8 (103)
No	66.5 (238)

[1]Where missing data exceeded 5 percent threshold, null records were dropped from denominator.

Enrollment in DASH. As part of the initial enrollment conversation, intervention staff discuss a range of topics with the participant related to their health, health history, health goals, and the DASH program. In our participant survey, participants were asked whether or not they recalled these discussions, as a means of understanding the salience of the conversations and how they might influence participant experiences with DASH. It should be noted that the length of time between enrollment in DASH and survey completion varies by survey respondent, with some respondents presumably having more recently enrolled and their conversations more recent in memory. Exhibit F.PCCSB.6 presents frequencies for responses to six different items related to enrollment.

Most respondents remembers discussing most topics with DASH staff during their enrollment visit. Of the six topics queried by the survey, the largest percentage of respondents (90 percent) recalled the discussion about their "health history, including your current health conditions," with 87 percent recalling conversations about when to call DASH, versus their primary care provider or 911. For each topic included in the survey, many respondents reported that they did not discuss the topic during enrollment (e.g., 34 percent answered "no" to recalling discussions about community resources), which may indicate a myriad of situations, including the irrelevance of that topic to participants (e.g., "tobacco use" for non-smokers), interpretation of the survey item, "…talk with you about" (i.e., did the respondent simply answer a yes/no question about smoking, and not engage in additional conversation on "tobacco use" with DASH staff), opportunities for DASH staff to engage in more comprehensive conversations (e.g., concerning "community resources"), or possibly memory lapses of respondents.

Exhibit F.PCCSB.6: DASH Survey: Enrollment Discussion

Variable	Respondents % (N)
When you first enrolled in Doctors Assisting Seniors at Home (DASH), did anyone from DASH talk with you about…	
Any difficulties you have with things like bathing, getting dressed, and your memory? (N=358)	
Yes	68.4 (245)
No	18.7 (67)
Can't Remember/Don't Know	10.9 (39)
Your health history, including your current health conditions? (N=358)	
Yes	89.7 (321)
No	3.6 (13)
Can't Remember/Don't Know	4.2 (15)
Tobacco use?[1] (N=323)	
Yes	55.4 (179)
No	31.3 (101)
Can't Remember/Don't Know	13.3 (43)
Signing up for community resources, like transportation and counseling, outside of the DASH program?[1] (N=316)	
Yes	42.1 (133)
No	34.2 (108)
Can't Remember/Don't Know	23.7 (75)
When to call DASH, when to call your primary care provider, and when to call 911?[1] (N=322)	
Yes	86.7 (279)
No	5.3 (17)
Can't Remember/Don't Know	8.1 (26)
Preferences for your health care?[1] (N=311)	
Yes	75.9 (236)
No	6.1 (19)
Can't Remember/Don't Know	18.0 (56)

NOTE: [1]Missing data exceeded 5 percent threshold; null records were dropped from the denominator.

Enrollment Goal(s). Most respondents enrolled because of the "safety net" that DASH provides when participants are not able to see their regular doctor. Exhibit F.PCCSB.7 shows that nearly half (48 percent) of respondents selected this goal as the primary reason they enrolled in DASH. The second most common goal reported was the avoidance of hospital visits/aggressive treatments (27 percent). Other reasons for DASH enrollment were selected in the survey far less often. Although respondents were asked to choose only one main goal from the list provided (and displayed in Exhibit F.PCCSB.8), many (n=36) chose multiple responses. Still, the two goals most often cited were the same: the "safety net" (75 percent) and avoidance of hospital visits/aggressive treatments (64 percent). Other open-ended responses (n=23) among participants listing a single or multiple goals included enrollment for spouses in community-based care facilities, on-call nature of DASH, and many "all of the above" responses. Regardless of the specific goal respondents set when enrolling in DASH, nearly all (99 percent) agree that the DASH program supports this goal.

Exhibit F.PCCSB.7: DASH Survey: Main Goal for DASH Enrollment

Variable	Respondents % (n)
When you enrolled in DASH, what was your main goal?[1] (N=297)	
Provide a safety net when I'm not able to see my regular doctor	48.2 (143)
Avoid a trip to the hospital/avoid aggressive treatments	27.3 (81)
Live independently in my home	8.1 (24)
Peace of mind	7.4 (22)
Identify the best place to go for the care I need	3.0 (9)
Relieve burden of family or caregivers	3.0 (9)
Other	3.0 (9)
DASH supports the main goal I made at enrollment.[1] (N=332)	
Strongly Agree	65.7 (218)
Agree	33.4 (111)
Disagree	0.9 (3)
Strongly Disagree	0 (0)

NOTE: [1]Missing data exceeded 5 percent threshold; null records were dropped from the denominator.

Support for Patient Preferences. DASH participants report that intervention staff support their preferences with regard to goal setting and provision of care, with an overwhelming majority of respondents agreeing or strongly agreeing with relevant statements (see Exhibit F.PCCSB.8). Very few respondents disagreed with these statements, indicating that DASH staff work closely with participants to ensure their choices are known and respected, and that the enrollment discussion on care preferences translates into practice. Documenting their own preferences on the POLST form, which nearly 76 percent of DASH survey respondents have completed, may be an embodiment of that sense of consideration participants perceive from the DASH staff. The DASH program also attempts to connect participants with important community-based services, such as home health care. Though not all participants need or want such referrals, among those survey respondents who have, nearly all agree or strongly agree that DASH helps to make those connections a reality.

Exhibit F.PCCSB.8: DASH Survey: Support for Participant Preferences

Variable	Respondents % (n)
DASH takes my wishes into account when helping me set my goals of care.[1] (N=321)	
Strongly Agree	57.0 (183)
Agree	41.4 (133)
Disagree	1.6 (5)
Strongly Disagree	0 (0)
DASH takes my wishes into account when providing care to me.[1] (N=311)	
Strongly Agree	60.1 (187)
Agree	38.3 (119)
Disagree	1.61 (5)
Strongly Disagree	0 (0)
DASH helps me get the services and supports that I need. For example, DASH helps arrange fast-track referrals to services such as home health care and hospice.[1] (N=321)	
Strongly Agree	31.2 (100)
Agree	24.3 (78)
Disagree	2.5 (8)
Strongly Disagree	0.3 (1)
Not Applicable to Me	41.7 (134)

NOTE: [1]Missing data exceeded 5 percent threshold; null records were dropped from the denominator.

Patient Satisfaction. Most survey respondents rated the DASH program very highly overall and feel that they can access its on-call, home-based services quickly, if needed, an integral feature of the program; see summary findings in Exhibit F.PCCSB.9. Whether participants need to simply contact DASH or request a home visit, they agree that they are able to make such contact or receive such a visit quickly. In fact, 68 percent of respondents strongly agree that they can get in touch with someone from DASH quickly, and 65 percent strongly agree that a DASH nurse or doctor will come to their home quickly. When staff responds to a request for a home visit, 93 percent of respondents feel the nurses and doctors spend enough time with them (among those who have had a home visit). The positive reaction to this type of stand-by rapid response, coupled with perceptions of unhurried visits, likely underlies survey respondents' assessment of the DASH program pace overall; that is, 88 percent reported that the DASH program "moves at just the right pace." Given the very positive feedback on the DASH program, it is unsurprising that 91 percent of respondents who pay the DASH subscription fee perceive that the program is a good value.

Exhibit F.PCCSB.9: DASH Survey: Satisfaction with DASH and Assessment of DASH Program Features

Variable	Respondents % (n)
Overall, how satisfied are you with the DASH program? (N=358)	
Very Satisfied	69.6 (249)
Satisfied	24.6 (88)
Dissatisfied	1.1 (4)
Very Dissatisfied	0.3 (1)
If I need it, I can get in touch with someone from DASH quickly.[1] (N=325)	
Strongly Agree	68.0 (221)
Agree	29.9 (97)
Disagree	1.5 (5)
Strongly Disagree	0.6 (2)
If I need it, a nurse or doctor from DASH will come to my home quickly.[1] (N=321)	
Strongly Agree	64.8 (208)
Agree	33.0 (106)
Disagree	2.2 (7)
Strongly Disagree	0 (0)
Do DASH nurses and doctors spend enough time with you? (N=358)	
Yes	73.2 (262)
No	2.2 (8)
Not Applicable because I only had an Enrollment Visit	21.5 (77)
Do you like the pace of the DASH program overall?[1] (N=311)	
DASH moves too quickly	9.3 (29)
DASH moves too slowly	2.9 (9)
DASH moves at just the right pace	87.8 (273)
If you pay the $60 subscription fee for the DASH program (or $90 for couples), is the program a good value for that fee?[1] (N=338)	
Yes	47.0 (159)
No	4.7 (16)
Not Applicable to Me	48.2 (163)

NOTE: [1]Missing data exceeded 5 percent threshold; null records were dropped from the denominator.

Value of DASH. Respondents were asked to identify the main "thing" with which DASH has been most helpful; summary findings are presented in Exhibit F.PCCSB.11. While a proportion of respondents (11 percent) indicated that they have not used DASH services since the enrollment visit, almost 60 percent noted "getting prompt medical care" and "preventing an ER visit" as the two most helpful outcomes of DASH. These selections suggest that enrollees' enrollment goals are being realized; as noted in Exhibit F.PCCSB.10 below, 76 percent of respondents noted that their main goal at enrollment was for DASH to provide a safety net when they are unable to see their regular doctor or to avoid a trip to the hospital/avoid aggressive treatment. Twenty two percent (n=65 respondents) selected more than one response, though across both groups (those marking a single answer versus those marking multiple answers), the top four outcomes that have been most helpful to them were the same (i.e., getting prompt medical care, preventing an ER visit, treating minor problems before they become serious, and providing a safety net). Additional write-in responses included "all of the above," as well as these noteworthy quotes[430]:

[430] Edited for spelling and grammar.

"The beauty of technology & iPhones: I contracted shingles after minor eye surgery. The DASH nurse came right away. She took a photo of the shingles, sent it in by phone to the doctor. Doctor came to my room, called in the prescription to [the pharmacy], and I was safe in the 26-hour frame of not having worst-case scenario!"

"When I had a serious dizzy spell, I didn't panic because I knew DASH would come if it didn't improve. By not getting real upset, I probably helped my situation. Several friends have called DASH with good results. I am so happy to have this service. My [DNR] statement is on my refrigerator, and with DASH's help, my family is set up with all paperwork to help me."

Exhibit F.PCCSB.10: DASH Survey: Most Helpful Outcome of DASH

Variable	Respondents % (n)
What is the main thing DASH has been most helpful with? (N=293[1])	
Getting prompt medical care	35.8 (105)
Preventing an ER visit	22.9 (67)
Treating minor problems before they become serious	8.2 (24)
Providing a safety net	7.5 (22)
Live independently in my residence	5.1 (15)
Identifying my goals for care, such as those recorded on my POLST form	2.7 (8)
Relieve burden of family or caregivers	1.4 (4)
Identify the best place to go for the care I need	1.0 (3)
Other	1.4 (4)
Avoiding aggressive treatments	0.7 (2)
NOT APPLICABLE BECAUSE I'VE ONLY HAD AN ENROLLMENT VISIT	10.6 (31)

NOTE: [1]Among respondents who provided a single response.

When asked about the one thing with which DASH could be more helpful, 190 (53 percent) respondents provided a response. Almost half (44 percent) of those responses did not include a suggestion but rather, underscored how satisfied respondents are with the DASH program in its current form. For example, one respondent wrote, "Based on our experience, there are no suggestions. Absolutely top notch, professional, timely assistance," and another, "…During my [#] years of life DASH stands out as a major advancement in medical care for the aged or infirm." These remarks exemplify the type of comments elicited by our question about potential improvements. Many respondents did offer specific suggestions for ways in which DASH could be more helpful, however, and the top three most commonly cited were:

- Extended hours (16 percent)
- More contact with staff (e.g., follow-up contact/visits, increased contact with doctors) (5 percent)
- More staff on-call (4 percent)

That respondents would like to see the DASH program have extended hours (e.g., after 7 p.m.) supports the awardee's report of similar participant feedback, and suggests that DASH participants understand how the value of the program may be increased by filling another gap in home-based care.

Proxy Respondents. Based on conversations with the awardee, and given our understanding of the target population, we anticipated that a small number of participants would be unable to complete the PCCSB survey independently. To encourage participation from a representative sample of all DASH participants, and not just those whose health enables them to complete the survey independently, we designed the survey to be completed by proxy respondents, if needed. This option would also allow us to collect important information about the experiences of informal caregivers with regard to DASH, as we expected that many proxy respondents would be providing care to DASH participants. Findings are presented in Exhibit F.PCCSB.12. More than one-fifth (21 percent, n=71) of respondents were proxy respondents. [431] The survey included 10 additional questions to be answered only by proxy respondents, including a question about the extent to which the proxy assisted the DASH participant with the survey. Most proxy respondents (72 percent) completed the questionnaire on the DASH participant's behalf.

Children of DASH participants are most likely (54 percent) to serve as proxy respondents for their parent, followed by spouses of DASH participants (21 percent). Whether or not the proxy respondent lives with the DASH participant (and 62 percent do *not*), most still commit a considerable amount of time to caregiving. For those providing any care to DASH enrollees, we asked them to provide the average number of hours per week that they spend caregiving. Of 45 respondents who reported an average, 73 percent provide at least 10 hours of care each week, while 27 percent care for a DASH participant more than 40 hours a week. Sixty-four (64) percent of proxy respondents have been caring for the DASH participant for at least two years.

[431] There were 331 respondents who answered the question, "Was this survey completed by someone other than the DASH participant?"

Exhibit F.PCCSB.11: DASH Survey: Proxy Respondent Background Information

Variable	Respondents % (n)
What is your relationship to the DASH participant? [1] (N=71)	
Spouse	21.1 (15)
Child	53.5 (38)
Other relative	5.6 (4)
Friend	7.0 (5)
Other	9.9 (7)
Do you live in the same household as the DASH participant? (N=71)	
Yes	36.6 (26)
No	62.0 (44)
How long have you been providing care to the DASH participant?[2] (N=67)	
Less than six months	9.0 (6)
More than 6 months but less than a year	4.5 (3)
More than a year but less than two years	10.5 (7)
Two years or longer	64.2 (43)
Not Applicable	10.5 (7)
Can't Remember/Don't Know	1.5 (1)
Thinking now of all the kinds of care you provide, how many hours do you spend in an average week providing care for the DASH participant?[2,3] (N=45)	
10 hours or less	26.7 (12)
Greater than 10 and <= 20	20.0 (9)
Greater than 20 and <= 30	20.0 (9)
Greater than 30 and <= 40	6.7 (3)
Greater than 40 and <= 50	6.7 (3)
Greater than 50 and <= 60	4.4 (2)
100+	15.6 (7)

NOTES: [1]Only asked of Proxy Respondents (N=71). [2]Missing data exceeded 5% threshold, null records dropped from denominator. [3]Only asked of Proxy Respondents who reported having provided care to the DASH participant.

Informal Caregiver Experience. To assess the impact of the DASH program on informal caregivers, whom we anticipated would serve as proxy respondents, we asked a series of questions to measure changes in different aspects of caregiving; see Exhibit F.PCCSB.12 for summary findings. While the DASH program does not target caregivers as part of its intervention, we expect that the improved delivery of care that DASH provides to its participants would affect the caregiving experiences of informal caregivers. Reports from the awardee indicate this impact as well, as they have relayed stories from caregivers who, with the help of DASH services, have avoided long wait times in the emergency room with the DASH participant.

We find that the majority of proxy respondents (70 percent) agree (or strongly agree) that communication with the DASH participant has improved because of the DASH program. Part of this increase in communication may be related to conversations that DASH participants have with family and friends concerning advance care planning and the POLST form, both of which are components of the DASH program. In addition, nearly half (47 percent) of proxy respondents say that they experience less emotional stress in connection with caring for the DASH participant since enrollment, again perhaps due in part to having made advance care planning decisions or simply peace of mind that they have additional support when needed, by virtue of the DASH team. Thirty-seven percent of proxy respondents also

reported less physical strain, perhaps tied to the in-home care visits that DASH provides, and 20 percent less financial hardship since their DASH care recipient enrolled in the program. Although the DASH model is not one of care coordination, 77 percent of proxy respondents indicated that the DASH program has helped them to coordinate care of the DASH enrollee more easily. It may be that the community referrals (e.g., to home health agencies) that DASH staff can facilitate, or the ability to access on-call, in-home care to fill in the gap between primary care and acute care, alleviate some of the burden that caregivers experience when trying to determine the best place to go for the care the DASH participant needs.

Exhibit F.PCCSB.12: DASH Survey: Experiences of Proxy Respondents

Variable	Respondents % (n)
To what extent do you agree with the following statement…Because of the DASH program, the communication between me and the DASH participant has improved?[2] (N=63)	
Strongly Agree	15.9 (10)
Agree	54.0 (34)
Disagree	25.4 (16)
Strongly Disagree	4.8 (3)
Since the DASH participant enrolled in the program, has there been more, less, or about the same amount of physical strain of caring for him/her?[2] (N=65)	
More Strain	7.7 (5)
Less Strain	36.9 (24)
About the Same	55.4 (36)
Since the DASH participant enrolled in the program, has there been more, less, or about the same amount of emotional stress of caring for him/her?[2] (N=66)	
More Stress	9.1 (6)
Less Stress	47.0 (31)
About the Same	43.9 (29)
Since the DASH participant enrolled in the program, has there been more, less, or about the same amount of financial hardship of caring for him/her?[2] (N=65)	
More Hardship	7.7 (5)
Less Hardship	20.0 (13)
About the Same	72.3 (47)
Has DASH helped you to coordinate the care of the DASH participant more easily?[2] (N=62)	
Yes	77.4 (48)
No	22.6 (14)

NOTES: [1]Only asked of Proxy Respondents (N=71). [2]Missing data exceeded 5% threshold, null records dropped from denominator.

Dis-enrolled Participants. We administered a brief survey to individuals whom DASH identified as no longer enrolled in the program (N=190); 40 surveys were returned to us. The survey included one open-ended question asking the reason the participant was no longer enrolled in the program, as well as three questions to capture information about proxy respondents (these three questions were also part of the enrolled survey and discussed above).

Most surveys were completed by a proxy respondent (61 percent). In contrast, only 21 percent of the enrolled surveys were completed by a proxy. This difference in proxy participation is likely due to dis-enrolled participants no longer needing DASH services because their health has worsened (i.e., either

dying or moving to hospice). In fact, 18 out of the 19 (95 percent) proxy respondents completed the survey on the dis-enrolled DASH participant's behalf. Most proxy respondents were children (68 percent) or spouses (26 percent) of DASH participants.

Thirty-eight of 40 dis-enrolled DASH survey respondents replied to the item asking for an open-ended explanation, in a few words, to "explain why you are no longer enrolled in the DASH program.**"** Most participants (48 percent) dis-enrolled due to death, moving to hospice care or an advanced care facility, or moving out of the catchment area. Some respondents also explained that they no longer felt the services were necessary given their health stability or that DASH did not meet their (more specific) medical needs. Other specific reasons for dis-enrollment included enrollment in other programs providing more regular physician house calls (n=2); the cost of the program was not a good value for the services provided (citing limited hours of service) (n=2); and dissatisfaction with treatment or specific features of the program (e.g., being seen by a nurse, rather than a physician, hours of operation). Several dis-enrolled respondents/proxy respondents noted their satisfaction or appreciation of DASH.

Pittsburgh Regional Health Initiative

Survey of Workforce Experience

NORC's survey is presented in our Second Annual Report to CMMI (2016).

Providence Portland Medical Center

Survey of Workforce Experience

NORC's survey is presented in our Second Annual Report to CMMI (2016).

South Carolina Research Foundation

Survey of Consumer Experience

Our evaluation includes findings from two sets of consumer survey data regarding South Carolina Research Foundation's HOME CARE+ intervention: 1) An NORC-collected consumer satisfaction survey with 162 survey respondents; and 2) an awardee-collected consumer satisfaction survey with a total of 454 respondents with both baseline and follow-up data, paired for analysis.

NORC-Collected Survey

The NORC-collected survey is a brief paper-based questionnaire administered by a Home Care Consultant (HCC) –the trained RN case manager that is key to the HOMECARE+ intervention –during their monthly visit with each participant, or conducted by phone (by the HCC) if an in-person visit is not possible. The purpose of the survey is to capture consumer assessments of the client's Personal Care Aides (PCAs) –a trained role that is part of HOMECARE+ --in terms of effect on access to care, quality of relationships, and client satisfaction with support received; a subset of health and demographic questions is also included.

NORC mailed hardcopy surveys and administration protocols to HCCs in May 2015 and the HCCs mailed completed consumer surveys back to NORC. Of the 162 completed surveys administered by HCCs, 78 (48 percent) were conducted in-person and 77 (48 percent) by phone. In September 2015, data were electronically entered for all surveys. Data were reviewed for completeness and to identify missing, invalid, skip logic errors, or out-of-range values. Little data were missing due to respondent error in reporting; missing observations are noted when computing response percentages for each survey item.

Results. The NORC survey respondents are similar, in both age and gender, to the participants directly served by the awardee; for example, about two-thirds of survey respondents are 65 or older (67 percent), similar to the percentage (almost 68 percent) of total participants reported by SCRF to CMMI (time period April 1 through June 20, 2015) and with females comprising 71 percent of survey respondents and 75 percent of all direct participants. See Exhibit F.SCRF.1 for a comparison by age categories.

Exhibit F.SCRF.1: Patient Ages, NORC Survey Respondents for SCRF

Age Categories	% (N) of Survey Respondents (N=161)	% (N) of Total Participants (N=399)
Less than 25 years old	1.9 (3)	0.8 (3)
26-64 years old	30.2 (49)	31.8 (127)
65-74 years old	25.3 (41)	24.6 (98)
≥75 years old	42.0 (68)	42.9 (171)

The NORC-collected survey characterizes the frequency and quality of supportive care provided by the Personal Care Aide:

- Frequency: Participants report that they saw their Home Care+ PCA frequently; 46 percent reported seeing their PCA every day, while another 51 percent report seeing their PCA a few times a week.
- Supportive Care: Almost all participants report that their PCA was supportive and treated them with respect. Exhibit F.SCRF.2 summarizes five measures of supportive care; over 95 percent of respondents reporting agreement or strong agreement with all measures.

Exhibit F.SCRF.2: Supportive Care Variables and Responses, NORC Survey of SCRF

Supportive Care Variables			% (N) Strongly Agree	% (N) Agree
1.	1	<PCA NAME> takes my opinions into account while helping me	69.1 (112)	28.4 (46)
1	2	<PCA NAME> supports the plan of care I set for myself	67.9 (110)	30.9 (50)
2	3	I feel like I can call <PCA NAME> or <HCC NAME> when I have an urgent issue	70.4 (114)	27.8 (45)
3	4	I have a good working relationship with <PCA NAME>	72.2 (117)	26.5 (43)
4	5	<PCA NAME> treats me with courtesy and respect	73.5 (119)	26.5 (43)

In general, survey respondents are likely to describe both physical and cognitive limitations. Of the 162 respondents, most had physical limitations, with 80 percent reporting serious difficulty walking or climbing stairs, 69 percent reporting difficulty dressing or bathing, and about half (54 percent) reporting

some cognitive concerns including serious difficulty concentrating, remembering, or making decisions. Almost half (48 percent) of all survey respondents had a nurse, family member, or someone else help them complete the survey.

Awardee-Collected Survey

The consumer survey fielded by SCRF is a paper-based questionnaire that was administered twice during visits with a HOMECARE+ client, once at baseline and again roughly six months into the intervention. The survey includes questions about general satisfaction with the intervention, as well as questions to understand who helps with a range of their health needs, their medication adherence and care seeking behavior in the previous six months. No demographics are included in this survey. Between the baseline and 6-month follow-up responses, we see an almost identical percentage of respondents completing the survey themselves, as opposed to using a proxy to complete the survey, with 80 percent of surveys completed by the participant and 20 percent completed by a proxy on behalf of the HOMECARE+ participant.

Data Analysis. NORC received baseline and follow-up survey data from SCRF in July, 2015. The dataset NORC received contains a total of 1,140 records. Our approach for analyzing the data set focuses on identifying differences in responses between baseline and 6-month follow-up. After reviewing the SCRF survey file, a total of 232 records were dropped from our final analytic file because pre-post comparisons were not possible with these records.[432] Our final analytic data file contains 908 records that were then paired based on participant ID, resulting in 454 paired records. Where variation in response patterns points to a potential statistically significant difference between baseline and follow-up survey data, we perform a chi-square or t-test and report the results in the discussion below.

In order to perform statistical tests on baseline and follow-up survey responses, categorical survey items are dummy-coded into dichotomous variables in the following ways:

- For questions where 'non-response' answers (e.g. Does Not Apply, Unsure/Don't Know, No Response) constitute less than 5 percent of the total response data, 'non-response' answers are dropped and a dichotomous variable formed by grouping together the 'positive' and 'negative/neutral' responses for the survey question.
- For questions where 'non-response' answers constitute more than 5 percent of the total data response, a t-test is performed on 'response' vs. 'non-response' groupings. If the difference is statistically significant, a chi-square test is performed, grouping together the 'positive,' 'negative/neutral' and 'non-response' items for the survey question.

Results. Overall, survey respondents are satisfied with their home care experience during the intervention, both at baseline (83 percent were 'extremely' or 'very' satisfied) and at the 6-month follow-up (with 93 percent combined). There are significant improvements between the baseline survey and 6-month follow-up on a wide range of variables, including statistically significant ($p<0.05$) differences in

[432] Issues prompting the exclusion of these cases included baseline/follow-up survey administration date discrepancies (e.g., for six records, the date of the 6-month follow-up survey occurred before the date of the baseline survey), null records (N=6), more than one baseline or follow-up survey record included in the original SCRF data file (N=14), and missing baseline or follow-up records (N=206).

the self-reported health status, on a subset of general satisfaction questions, measures related to medication adherence and client understanding, and questions related to access to care.

Self-reported health status. Between baseline and follow-up, there are statistically significant increases in reported 'very good' health and decreases in reported 'poor' health; see Exhibit F.SCRF.3 for a summary.[433] While the small response sizes for some health status categories limits the strength of this finding, we can conclude that self-reported health appears to have improved during the HOMECARE+ intervention.

Exhibit F.SCRF.3: Self-Reported Health Status, Changes from Baseline to Follow-up

Health Status Categories	% (N) at Baseline	% (N) at 6-Months	Change from Baseline to Follow-up
In general, would you say your health is…			
Excellent	1.1 (5)	2.0 (9)	increase
Very Good	5.1 (23)	12.1 (55)	increase
Good	27.3 (124)	39.2 (178)	decrease
Fair	47.6 (216)	37.2 (169)	decrease
Poor	18.9 (86)	9.5 (43)	decrease

Patient Satisfaction and Ratings of Care. At the 6-month follow-up survey, almost all survey respondents indicate that they received high-quality and supportive care, with 93 percent reporting they were 'extremely' or 'very' satisfied with the skill of their personal care aide (PCA) and 93 percent reporting a similar degree of satisfaction with how safely they were handled by their PCA. These percentages reflect increases in satisfaction from the baseline survey. In fact, participants reported increases in satisfaction and ratings of care across all satisfaction and care quality variables between baseline and follow-up, and when these differences between time points were tested, we find statistically significant increases in satisfaction (one variable) and quality of care (two variables); see Exhibits F.SCRF.4 and F.SCRF.5, respectively.

Exhibit F.SCRF.4: Satisfaction with Care, Baseline and Follow-up

Satisfaction Variable§	% (N) Extremely/Very Satisfied at Baseline	% (N) Extremely/Very Satisfied at Follow-up	Change between Baseline and Follow-up
How satisfied are you with the skill of your aide when providing care?	84.1 (382)	93.2 (423)	increase*
How satisfied are you with how safely you are handled by your home care aide?	84.4 (383)	92.7 (421)	increase
How satisfied are you in general with your home care?	83.3 (378)	92.5 (420)	increase

NOTES: *Difference is statistically significant between baseline and follow-up at p<.05. §T-test performed on collapsed responses of "Extremely/Very" v. "Somewhat/Slightly/Not at All."

[433] Tested using a t-test between "excellent/very good/good" v. "fair/poor"), with a finding of significance at the p<0.05 level.

Exhibit F.SCRF.5: Quality of Care, Baseline and Follow-up

Quality of Care Variable§	% (N) Excellent/Very Good/Good at Baseline	% (N) Excellent/Very Good/Good at Follow-up	Change between Baseline and Follow-up
How well coordinated is your medical care including medications, appointments, and home care needs?	88.8 (403)	97.4 (442)	increase*
How would you rate the overall quality of your home care?	89 (404)	95.9 (435)	increase

NOTES: *Difference is statistically significant between baseline and follow-up at p<.05. §T-test performed on collapsed responses of "Excellent/Very Good/Good" v. "Average/Poor/Very Poor."

The SCRF survey includes a set of four statements pertaining to self-reported feelings of support in connection with implementation of HOMECARE+. Between baseline and follow-up, there is an improvement in the percentage of respondents in agreement with each statements ('agree' or 'strongly agree'), as follows:

- *I feel that my personal wishes are taken into account* (92 percent of respondents agree)*
- *I feel I am listened to* (94 percent of respondents agree)*
- *I feel that what I say is taken into account* (92 percent of respondents agree)*
- *I feel that my decisions are respected even when I disagree with others (89 percent of respondents agree)*

For three of the four statements (denoted with an *), improvements represent statistically significantly differences from baseline.[434]

Medication Adherence. As shown in Exhibit F.SCRF.6, there are statistically significant differences in respondents' reported baseline and follow-up behavior with respect to medication. These differences reflect modest increases in positive behaviors, such as the 27 percent increase in respondents who say they 'never' or 'almost never' forget to take their medicine. Results also show large decreases in reported negative medication habits, including a 61 percent decrease in the number of respondents who reported that they 'sometimes' forget their medicine.

[434] For the first and third statements, a Chi square is performed on collapsed responses of "Strongly Agree/Agree" versus "Disagree/Strongly Disagree" versus "No Response/Don't Know." For the second statement, a T-Test is performed on collapsed responses of "Strongly Agree/Agree" versus "Disagree/Strongly Disagree."

Exhibit F.SCRF.6: Reported Medication Habits at Baseline and Follow-up

Medication Habit Variables§	% (N) at Baseline	% (N) at Follow-up	Change from Baseline to "Follow-up
Do you ever forget to take your medicine?			
Always/Almost Always/Sometimes	26.9 (122)	9.9 (45)	decrease
Never/Almost Never	70.7 (321)	89.6 (407)	increase
Are you careless at times about taking your medicine?			
Always/Almost Always/Sometimes	14.8 (67)	4.8 (22)	decrease
Never/Almost Never	83.3 (378)	93.8 (426)	increase
When you feel better, do you sometimes stop taking your medicine?			
Always/Almost Always/Sometimes	9.5 (43)	2.2 (10)	decrease
Never/Almost Never	89.4 (406)	97.1 (441)	increase
Sometimes if you feel worse when you take your medicine do you stop taking it?			
Always/Almost Always/Sometimes	16.7 (76)	4.8 (22)	decrease
Never/Almost Never	81.9 (372)	93.6 (425)	increase
Are you having problems taking your medicine according to the directions?			
Always/Almost Always/Sometimes	9.5 (43)	3.1 (14)	decrease
Never/Almost Never	88.3 (401)	96.3 (437)	increase

NOTES: *Differences are statistically significant between baseline and follow-up at p<.05. § T-test performed on collapsed responses of "Always/Almost Always/Sometimes" v. "Never/Almost Never."

Making Medical Decisions and Seeking Care. The SCRF survey asks four open-ended 'point of contact' questions to identify those who most often help respondents to obtain care. Across baseline and follow-up, responses show reliance on family members (e.g., spouse, child, sibling) as the first point of contact when making decisions or when feeling unwell. Aside from family members, the 'doctor's office' is the most frequent response across all four "points of contact" questions (shown in Exhibit F.SCRF.7), and responses for both 'family member' and 'doctor's office' increase slightly from baseline to follow-up.

Responses identify key HOMECARE+ staff roles, including the introduction of trained home health agency RNs serving as Home Care Consultants (HCC).[435] As expected, HCCs were rarely a first point of contact at baseline, but responses show a sharp increase in reliance on this new role at the 6-month follow-up. To a lesser extent, responses also increased for' Care Provider Agency Nurse' and 'HCS' (Home Care Specialist, the newly trained PCA role introduced by HOMECARE+) as a point of contact, between baseline and follow-up survey.

[435] Please note that survey respondents often indicated more than one point of contact for the four "point of contact" questions. These are questions 6-8 and 10 in the SCRF-collected survey.

Exhibit F.SCRF.7: Role of Home Care Consultant, Change between Baseline and Follow-up

Survey Questions about Point of Contact (POC) for Intervention	% (N) Selecting POC at Baseline	% (N) Selecting POC at Follow-up
6. Who do you talk to first about making decisions about your health care needs?		
Home Care Consultant	0 (0)	17.6 (80)
Family	75.3 (342)	79.5 (361)
Doctor's Office	21 (95)	26.4 (120)
7. Who do you call when you are sick?		
Home Care Consultant	0.22 (1)	16.5 (75)
Family	75.3 (342)	71.8 (326)
Doctor's Office	22.2 (101)	37.9 (172)
911	3.3 (15)	1.1 (5)
Hospital/ER	1.1 (5)	0.0 (0)
8. Who coordinates your medical care including medications, appointments, home care needs?		
Home Care Consultant	0.22 (1)	12.6 (57)
Family	61.2 (278)	64.1 (291)
Doctor's Office	6.4 (29)	9.7 (44)
10. Who supports you with your health care concerns?		
Home Care Consultant	0.22 (1)	31.7 (144)
Family	79.1 (359)	81.1 (368)
Doctor's Office	13.9 (63)	19.2 (87)

Exhibit F.SCRF.7 offers preliminary support for the effectiveness of HOMECARE+ in care coordination that encourages reliance on a Home Care Consultant or a doctor's office, rather than a call to 911 or ED visit, as reflected in changes in survey responses between baseline and follow-up. Additionally, survey respondents are asked about the number of times they had sought medical care in the past six months at the doctor's office, hospital, ER, and urgent care. T-tests of mean visits to each resource at baseline and follow-up show statistically different ($p<0.05$) means for doctor's office, hospital, and ER visits, including a decrease in the mean number of reported trips to the ER from one to zero.

Survey of Workforce Experience

In this section, we present findings of NORC's survey of workforce trainee experience in connection with HOMECARE+. The workforce survey focuses on the direct care workers (personal care aides, or PCAs), who are trained to serve as Home Care Specialists, that collaborate with a small number of registered nurse care managers (Home Care Consultants) based at participating personal care provider agencies (PCPAs).[436]

NORC coordinated with SCRF to create and tailor a survey questionnaire to collect data on the PCAs' experience with the intervention. The personal care provider agencies distributed the paper-based surveys

[436] The number of RN Home Care Consultants (n=17) was too small a respondent group for NORC to field a survey; for this reason, interviews, focus groups, and site visit observations were used to gather data about workforce training experience across all HOMECARE+ staff; findings about Home Care Consultants have been featured in previous NORC reports to CMMI.

to personal care aides (PCAs) who had taken at least one Home Care Specialist training through HOMECARE+ (N=414 PCAs). Surveys were fielded from May 18, 2015 through August 1, 2015.

The workforce survey contains questions about PCAs' working relationship with the RN Home Care Consultants, daily work, thoughts regarding the impact of the Home Care Specialist training program, and a limited number of demographic questions. The personal care provider agencies returned the completed surveys to NORC by mail, along with contact information for those PCAs who had participated in the survey. NORC subsequently mailed $10 gift cards to respondents for their participation. Survey responses recorded on the paper instruments were entered electronically and checked for accuracy of data entry.

Description of Survey Respondents. Of the 414 PCAs invited to participate in the survey, 187 completed the majority of the survey questions and submitted the survey to NORC. On average, respondents served two clients each week, and a third (32 percent) reported working an average of 10 to 20 hours a week. The majority of respondents were female (97 percent) and Black or African American (78 percent). Approximately half of respondents have earned a high school or GED degree (47 percent) and about one third of respondents have attended some college or earned less than a 4-year degree (34 percent). The average age of respondents was 51 years, and the majority of respondents had worked directly with older adults for 10 or more years. Exhibit F.SCRF.8 presents further information about the demographic characteristics of the respondents.

Exhibit F.SCRF.8: HOMECARE+ Survey: Demographic Characteristics, Personal Care Aides

Variable	Value
Number of Respondents	**187**
	Frequency % (N)
Gender	
Female	96.8 (181)
Race	
White	16.0 (30)
Black or African American	77.5 (145)
Asian	0.5 (1)
American Indian or Alaska Native	0.5 (1)
Other	2.1 (4)
Multiple Response	0.5 (1)
Highest Level of Education	
Less than high school	8.6 (16)
High school or GED	47.1 (88)
Some college or less than 4-year degree	34.2 (64)
College graduate or 4-year degree	6.4 (12)
Age	
Less than 30 years old	7.5 (14)
30-54 years old	44.3 (83)
55-64 years old	33.2 (62)
65-74 years old	10.2 (19)
≥ 75 years old	2.7 (5)

Training Experience. A total of 121 respondents (65 percent) completed all 13 HCS training modules; the other 66 respondents reported various combinations of coursework. The courses with the highest percentage in attendance are "Introduction to the Role of the Home Care Specialist," "Stroke," "Dehydration," and "Congestive Heart Failure"; see Exhibit F.SCRF.9.

Exhibit F.SCRF.9: HOMECARE+ Survey: Completion of Training Modules by Personal Care Aides

Variable	
Number of Respondents	**187**
Training	**Frequency % (N)**
Module 1: Introduction to the role of Home Care Specialist	95.2 (178)
Module 2: Congestive Heart Failure	87.7 (164)
Module 3: Dehydration	88.2 (165)
Module 4: Pneumonia	85.0 (159)
Module 5: Incontinence and Urinary Tract Infections	81.8 (153)
Module 6: Heart Attack	81.8 (153)
Module 7: Chronic Obstructive Pulmonary Disease	81.8 (153)
Module 8: Hypertension	87.2 (163)
Module 9: Stroke	89.3 (167)
Module 10: Diabetes	86.6 (162)
Module 11: Mental Status Changes/Dementia	84.0 (157)
Module 12: The Final Phase of Life	76.5 (143)
Module 13: Falls	74.3 (139)

PCAs who responded to the survey were very positive about their feelings regarding the HCS trainings. Almost all (96 percent) reported that the HCS trainings made them feel better prepared to be a PCA and more helpful to their clients and that the skills they learned in these HCS trainings helped them to perform their duties with clients (98 percent). Over half (59 percent) reported that they "liked their job" more since starting the HCS trainings and 38 percent reported liking it about the same.

Team Experience with Home Care Consultants. Almost all PCAs who responded to the survey reported that their Home Care Consultants (HCCs) were easy to communicate with, supportive, and helped them provide better care to their clients.[437]

- **Frequency of communication.** Of the 153 PCAs that reported regular communication with their HCC, 42 percent reported speaking with the HCC a few times a month, 22 percent reported once a month communication, 28 percent a few times a week, and 9 percent daily.
- **Ease of communication.** Of those PCAs that responded about ease of communication (n=158), 99% agreed that they felt comfortable talking to their HCC about changes in their client's health, and 99% agreed that their HCC explained things in a way that was easy to understand.

Of those that responded (n=157), almost all respondents (99 percent) agreed that their HCC helped them to provide better care to their clients. Of the 160 PCAs that responded, all agreed that they felt supported by their HCC.

[437] Please note that the majority of null responses for these HCC related questions are due to a skip pattern; respondents were instructed to skip these questions if they had never met with an HCC.

HCCs provided helpful feedback to the PCAs. Almost all respondents reported that their HCCs listened to them, addressed their concerns, let them know what they were doing well, and suggested ways they could do better; see Exhibit F.SCRF.10. Of those PCAs that responded (n=158), almost all found this feedback very helpful (85 percent) or somewhat helpful (14 percent).

Exhibit F.SCRF.10: HOMECARE+ Survey: Ratings of Feedback Provided by Home Care Consultants

Variable	Number of Responders Who Answered Yes/ Number of Respondents (N)	% Responded Yes
When you (talk/talked) with your Home Care Consultant, (does/did) he or she:		
suggest ways you could do your job better	149/158	94.0
tell you things you are doing well	154/156	99.0
listen to you	156/157	99.0
address your concerns	150/150	100.0

Job Satisfaction. Overall, PCAs were satisfied with quality of care they were providing and planned to continue on in this line of work. About three-quarters of respondents (73 percent) reported that when they thought about their work as a PCA, they viewed it as a long-term career, while 11 percent viewed it as a short-term job, 13 percent did not know, and 3 percent did not respond. All PCAs who responded about their quality of care (n=185) were either "very happy" or "somewhat happy" with the quality of care they provided to their clients**.**

Sutter Health

Survey of Workforce Experience

NORC presented these findings in our Second Annual Report to CMMI (2016).

University Emergency Medical Services

Survey of Consumer Experience

As of March 30th, 2015, UEMS had collected assessments from a total of 152 HealthiER patients (10.2 percent of enrollees) at both baseline and at least one follow-up (due to occur approximately every 6 weeks following enrollment); less than 10 percent of those enrolled have survey data available from both baseline and follow-up. We summarize patient-reported data at baseline and follow-up (when available) from a small subset of enrolled patients regarding patient engagement and care planning, patient satisfaction, and patient health. UEMS collected and analyzed the data and provided NORC with a summary of the results. To examine changes over time in patient-reported outcomes, UEMS utilized paired t-tests for continuous variables and McNemar's tests for dichotomous variables.

Patient Engagement and Care Planning. HealthiER uses a team of community health workers to improve access to primary care, coordinate care across providers, and engage patients in identifying and working toward their own health care goals. At baseline, an average of about 67 percent of patients

reported having a primary care provider (PCP). At last follow-up, the average number of patients reporting that they have a PCP significantly increased to 93 percent ($p < .001$; N = 144).

The Patient Activation Measure (PAM) is used to measure a patient's confidence in their ability to navigate the health care system and manage their own health concerns. There is an average mean decrease of -0.28 from baseline (M=40.2, SD = 5.3) to last follow-up (M=39.9, SD=5.6); however, this was not statistically significant.[438]

The Health Care Climate Questionnaire (HCCQ), a validated measure of perceived autonomy support, was adapted to assess the degree to which the HealthiER CHWs support patient's preferences, values and choices. While this measure was not assessed at baseline, patients reported an average rating of 6.77 (SD=0.57) at last follow-up where response options ranged from 1 (strongly disagree) to 7 (strongly agree). The follow-up value uses 133 patient questionnaires from 106 unique patients.

Patient Satisfaction. UEMS developed a set of questions used to assess patient satisfaction with their CHW (e.g., likeability and helpfulness). These questions were similar to HCCQ in that it was only assessed at follow-up, was based off of 133 patient questionnaires from 106 unique patients, and used a scale that ranges from 1, *strongly disagree*, to 7, *strongly agree*. HealthiER patients reported an average satisfaction score of 6.87 (SD=0.48) at last follow-up.

Patient Health. UEMS used two instruments to assess health.

- The Patient Health Questionnaire (PHQ-9) was used to a screen patients for depression at both baseline and follow-up. The number of patients reporting at least moderate depressive symptoms (score < 9, N=94) decreased from 37 percent at baseline to 35 percent at last follow-up, although this small decrease did not reach statistical significance ($p = 0.52$).
- A total of 70 HealthiER patients answered the SF-12® Health Survey, a validated measure of perceived mental and physical health status, at both baseline and follow-up. At baseline, patients reported an average physical health score of 40.5 (SD=11.3). At last follow-up, patient scores significantly increased to an average physical health score of 44 (SD=9.7), where a higher score indicates better physical functioning.[439]

University of Arkansas for Medical Sciences

Survey of Workforce Experience

In our Second Annual Report to CMMI (2016), we present findings from our initial analysis of our workforce experience survey for UAMS's HCIA-funded training. This survey captures the perceptions and assessments of the direct care workers who have enrolled in this training, comparing the responses of workers trained at the Schmieding Center (n=727, representing a 57 percent response rate) with Arkansas-based caregivers trained elsewhere (n=249, a 66 percent response rate).

Overall findings include the following:

[438] $t(96)=.77$, $p = 0.44$.

[439] $t(69)=-2.51$, $p <.05$.

- Very positive feedback about UAMS training overall with regard to satisfaction, the structure of the training, and skills learned.
- Ratings of satisfaction that differ based on caregiving role and employment status. Unpaid family caregivers who completed UAMS courses report lower satisfaction with the training overall, and fewer report learning specific caregiving skills, compared to trainees currently employed as caregivers. A similar pattern is observed among UAMS trainees who current report being unemployed, when compared with employed caregivers.
- Advantages in skills and workplace satisfaction reported by trainees who have completed the HCIA-funded and advanced-level Family Care Advocate (FCA) course. A higher percentage of UAMS trainees who have completed the Family Care Advocate (FCA) course report learning specific caregiving skills, compared with those who have not completed the course, and are also more likely to report positive experiences with their agency of employment.

Exhibit F.UAMS.1: 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)

Here, we present additional findings from our analysis of UAMS survey data, focusing on the workforce experiences of UAMS trainees and the comparison group and a few additional demographic and training questions that had not been summarized in our earlier report to CMMI.

Background. We asked respondents in both groups to recount all certifications. Exhibit F.UAMS.2 shows the proportion of respondents in either group who report a particular certification (respondents could report more than one certification). In general, more UAMS trainees than those in the comparison group have earned each of the certifications listed. However, more comparison group respondents (38 percent) report being a Certified Nurse Assistant than do UAMS respondents (30 percent). There are not standardized certifications for direct care workers as there are for Certified Nursing Assistants and Home Health Aides; therefore, it is difficult to know the comparability among certifications for Personal Care Assistant, In Home Care Assistant, or Home Caregiver Certificate. Direct care worker certifications may be specific to the type of training organization conferring them (rather than based on state and/or standard curriculum). Respondents also hold other certifications not listed as response options, indicating the varied—and related—backgrounds many bring to their caregiving work; "other" certifications include first aid, CPR, nursing, and EMT, among others.

This section includes results from additional demographic and training questions asked of the UAMS trainees and comparison workforce group. Examining both groups in terms of household size and income, we find both groups are relatively similar, with the majority of caregivers in both groups (62 percent of UAMS and 59 percent comparison group) living alone or with one other person. There is some observed

difference in household income. Almost half of the UAMS trainees (49 percent) report household incomes of at least $25,000, while only 39 percent of those in the comparison group report similar household incomes. As we discuss later in this section, differences in wages may be the reasons for the differences in household earnings between the two groups.

Exhibit F.UAMS.2: UAMS Trainee Survey: Additional Respondent Background Information

Variable	Respondents % (N)	
	UAMS Trainees	Comparison
Certifications Held by Respondents[1]	**N=727**	**N=249**
Personal Care Assistant	45.4 (330)	36.1 (90)
In Home Care Assistant	38.5 (280)	9.6 (24)
Certified Nurse Assistant	30.3 (220)	38.2 (95)
Home Health Aide	25.5 (185)	15.3 (38)
Home Caregiver Certificate	36.3 (264)	17.3 (43)
Other	53.4 (388)	37.8 (94)
Household Income	**N=727**	**N=249**
Less than $15,000 per year	21.9 (159)	24.5 (61)
$15,000 to $24,999	16.5 (120)	26.1 (65)
$25,000 to $34,999	16.1 (117)	14.1 (35)
$35,000 to $49,999	10.7 (78)	12.1 (30)
$50,000 or greater	21.9 (159)	12.9 (32)
DON'T KNOW	5.9 (43)	5.2 (13)
REFUSED	7.0 (51)	5.2 (13)
How many people live in your household? (Includes respondent)	**N=727**	**N=249**
One	19.7 (143)	18.5 (46)
Two	42.4 (308)	41.0 (102)
Three	19.0 (138)	18.5 (46)
Four	10.6 (77)	12.1 (30)
Five	5.2 (38)	6.0 (15)
Six or more	3.0 (22)	3.2 (8)

NOTES: [1]Respondents could answer with any combination of certifications. Reported frequencies represent the number of cases where the given value was included in the response. Percent represents the percent of the total 727 UAMS/249 comparison group respondents who included the given value in their response.

Source(s) of Training. Exhibit F.UAMS.3 displays the sources of training for the comparison group, as well as the sources for any additional caregiver training that UAMS respondents completed at other organizations. Most UAMS trainees (68 percent) have not received training other than that provided by Schmieding. Even when a UAMS respondent has completed training outside of Schmieding, 45 percent have received the majority of their caregiver training at Schmieding. Eighty-five percent of the comparison group reported "other training organization" as the source of most of their training. This was most likely their employer, given that recruitment of the comparison group involved outreach to home health and home care agencies around the state, with the largest two agencies offering their own caregiver training programs.

Employers played a far greater role in paying for the comparison group's training (57 percent of respondents noting an employer/agency paid) than they did for UAMS respondents (10 percent). Furthermore, fewer comparison group respondents (15 percent) than UAMS respondents (43 percent)

paid for their own training. Most UAMS respondents relied on their own financing or that from "other" sources such as grants and scholarships (41 percent). Only six percent of the UAMS group used the micro-credit loan to pay for training, and as discussed in Q7, most of those trainees who did not apply for the loan reported that they did not need it.

Exhibit F.UAMS.3: UAMS Trainee Survey: Training Organization and Payer

Variable	Respondents % (N)	
	UAMS Trainees	Comparison
Where did you receive the majority of your training to become a caregiver?[1]	**N=236**	**N=249**
Schmieding Center (UAMS Trainees Only)	44.9 (106)	N/A
4-Year College or Community College	11.9 (28)	12.5 (31)
Other Training Organization	42.0 (99)	84.7 (211)
How did you pay for your training?	**N=727**	**N=249**
I paid for it	43.1 (313)	15.3 (38)
My employer or agency paid for it	9.5 (69)	57.4 (143)
Micro-credit loan through Schmieding Center	5.6 (41)	N/A
Other (scholarships, grants, family members, state-based programs, etc.)	41.3 (300)	26.1 (65)
Don't know	0.6 (4)	0.8 (2)

NOTE: [1]Only asked of UAMS respondents who reported having received training somewhere other than Schmieding (i.e., 491 respondents skipped this question), as well as the comparison group.

Workforce Experience. The survey also included questions about respondents' satisfaction with different aspects of their jobs. As reported earlier, we analyzed UAMS survey data by three sub-groups within the UAMS-trainee and comparison group samples, based on caregiver work status:

- Currently working as caregiver;
- Unpaid family caregiver; and
- Completed caregiver training but not currently working as a caregiver or as an unpaid family caregiver.

These sub-groups allow for a more direct comparison of the treatment and comparison groups, thus removing variation due to differences between respondents based on work status. Our focus for the workforce questions presented in this report is on the first sub-group, those respondents currently working as caregivers, as this is also the target population for the UAMS caregiver training program. By focusing on this sub-group, we aim to provide a more complete picture of the workforce experiences of these caregivers. Where variation in response patterns between currently working UAMS and comparison group caregivers pointed to a potential statistically significant difference between the two groups, we performed chi square or independent samples t-tests.

As shown in Exhibit F.UAMS.4, among respondents currently working as caregivers, roughly the same proportion of UAMS (24 percent) and comparison group (26 percent) caregivers have worked for more than one home care/home health agency at a time. This finding indicates that some direct care workers may not receive the number of hours or income they need—or want—by working for one agency at a time. Managing obligations (e.g., schedules) for multiple employers may be stressful, logistically and

emotionally. Furthermore, agencies may have different expectations for caregiving approaches and protocols, and they may vary in the type and amount of support and mentorship provided to caregivers. This may create challenges for caregivers as they try to put new skills and ideas learned in training into practice.

We compared UAMS and comparison group respondents on reports of satisfaction with various aspects of their job. For respondents who mentioned that they currently work for more than one agency, interviewers prompted them to answer the questions for the agency for which they work the most. When asked about satisfaction with their employer agency, both groups reported similar satisfaction levels, with 67 percent of UAMS caregivers and 69 percent of the comparison group "very satisfied" with their agency, followed by 24 percent (UAMS) and 23 percent (comparison group) "somewhat satisfied." Likewise, the vast majority of both groups rate satisfaction with client relationships highly, with 93 percent of both UAMS trainees and comparators reporting they are "very satisfied."

The two groups diverge, however, on wages and their satisfaction with these wages. On average, UAMS-trained caregivers earn $9.37 an hour, while caregivers from the comparison group earn $8.96 an hour, a statistically significant difference. There are many factors that may influence this difference between groups, including caregiving experience, type and geographic location of employer (or whether an independent contractor), and educational background, as well as the type and amount of caregiving training received. Unsurprisingly, we found that significantly more UAMS-trained caregivers (30 percent) are "very satisfied" with their wages, compared with only 15 percent of the comparison group. UAMS trainees and the comparison group also differ significantly in their satisfaction with the number of hours they work (59 percent of UAMS trainees are "very satisfied," compared with 52 percent of the comparison group). Although we did not ask respondents to report the number of hours they work each week, we did ask about the average number of hours they spend with each client in a week, as well as the number of clients they serve each week. Using these data to approximate the number of hours respondents work each week, we find that UAMS respondents work about 42.3 hours weekly and comparators work about 38.9 hours weekly. This finding indicates that having at least 40 hours of caregiving work each week is important to respondents and may be influencing satisfaction with the number of hours worked.

Exhibit F.UAMS.4: UAMS Trainee Survey: Workforce Experience

Variable	Respondents % (N)	
	UAMS Trainees Employed as Caregivers	Comparison Group Employed as Caregivers
Have you worked for more than one agency at a time?[1]	**N=293**	**N=195**
Yes	24.2 (71)	26.2 (51)
No	75.4 (221)	73.9 (144)
Satisfaction with the agency you work for[1]	**N=293**	**N=195**
Very satisfied	66.6 (195)	68.7 (134)
Somewhat satisfied	24.2 (71)	22.6 (44)
Neither satisfied nor dissatisfied	2.4 (7)	3.1 (6)
Somewhat dissatisfied	4.4 (13)	2.6 (5)
Very dissatisfied	0.3 (1)	3.1 (6)
Does not apply	2.1 (6)	--
Satisfaction with your wage	**N=445**	**N=204**
Very satisfied	30.1 (134)*	15.2 (31)*
Somewhat satisfied	35.1 (156)	40.2 (82)
Neither satisfied nor dissatisfied	5.4 (24)	5.9 (12)
Somewhat dissatisfied	14.4 (64)	13.7 (28)
Very dissatisfied	11.2 (50)	22.6 (46)
Does not apply	2.9 (13)	2.5 (5)
Satisfaction with the number of hours you work	**N=445**	**N=204**
Very satisfied	58.7 (261)*	52.0 (106)*
Somewhat satisfied	27.4 (122)	22.6 (46)
Neither satisfied nor dissatisfied	2.7 (12)	5.4 (11)
Somewhat dissatisfied	5.8 (26)	10.8 (22)
Very dissatisfied	4.3 (19)	8.8 (18)
Does not apply	0.9 (4)	0.5 (1)
Satisfaction with your relationship with your clients	**N=445**	**N=204**
Very satisfied	92.8 (413)	92.7 (189)
Somewhat satisfied	5.4 (24)	5.4 (11)
Neither satisfied nor dissatisfied	0.5 (2)	1.0 (2)
Somewhat dissatisfied	0.5 (2)	0.5 (1)
Very dissatisfied	0.5 (2)	--
Does not apply	0.5 (2)	0.5 (1)
What is your hourly rate? [1 2]	**N=293**	**N=195**
	$9.37 (274)*	$8.96 (190)*

NOTES: [1]Only asked of respondents who identified as working for a "Home Care or Home Health Agency" or for "Both Agency and Independent Contractor" (n=293 UAMS and n=195 comparison respondents). [2]Responses of Don't Know/Refused have been excluded from the mean.
*Differences in responses between UAMS and comparison group reaches statistical significance at p<.01.

Limitations and Next Steps. An important limitation of our workforce survey analysis is the small number of comparison group respondents who are employed independently (i.e., not employed with an agency), as type of employment may be influencing the significant wage difference between UAMS trainees (with more caregivers who are independently contracted) and the comparison group. Given our difficulties with identifying comparison sample for the survey and the way in which comparators were

ultimately recruited (i.e., heavily from agencies employing caregivers), differences in outcomes could be affected by the employment profiles of our treatment and comparison groups.

University of Iowa

Survey of Consumer Experience

U Iowa developed and conducted a survey of TCT patients in the first half of 2015. This brief survey consisted of approximately 10 questions that focused on patient reports of communication with the TCT intervention staff and helpfulness of these communications; whether or not the patient's primary care physician was informed about their hospital stay associated with the TCT intervention; and a rating of the patient's overall experience with the TCT program. A total of 118 TCT patients participated in the survey, which was conducted over the phone. A maximum of two attempts was made to call an individual patient. The response rate was 53 percent (118/224). This rate was calculated using the number of completed calls (respondents who agreed to answer questions) as the numerator, and the count of completed calls plus phone calls resulting in no response, hang-ups or persons who indicated they were unable to answer as the denominator.

Patients were eligible for the survey if they agreed to participate in the TCT intervention and had been discharged between four and six weeks earlier from UIHC. Patients were not eligible or excluded from the survey if they had previously been surveyed, were currently hospitalized, or had special protections on their medical records. In addition, patients were excluded if they were not going to be followed by a local coordinator due to death, discharge to long-term care or with hospice, discharge out of county, or because the patient no longer wished to participate.[440] UIHC shared the raw survey data set with NORC in September 2015 so that we might conduct an independent analysis; UIHC also shared a summary report of the survey which described methodology, sample identification, administration, results, and limitations of the survey. UIHC acknowledged that the timing of the survey (in the last months of the intervention) and lack of a comparison sample, among other limitations, were important considerations when interpreting their survey results. The report also summarized results from qualitative interviews UIHC conducted during the same time period as the survey. The qualitative interviews provided UIHC with a greater understanding of the role of the TCT intervention in patients' lives, as well as information about the specific features of the intervention that were helpful to patients, such as personal contact, medication reconciliation, and learning about local supports and resources. Overall, NORC's analysis is consistent with the findings from the UIHC team, and respondents were pleased with their experiences. Respondents who were unwilling or unable to answer questions are not included in the table results. Key findings are highlighted below.

As shown in Exhibit F.UIHC.1, about nine out of ten patients were contacted on the phone by the TCT coordinator in under three days. Contact within this time period is important for addressing any patient or caregiver concerns, confusion about discharge instructions or medications, and to assess whether the patient is recovering as expected or experiencing worsening symptoms. Slightly fewer patients were contacted by the local coordinator. About three-fourths of those contacted (by the TCT or local

[440] Source: Dukes et al., Short Report on the Transitional Care Program Patient Survey. University of Iowa Hospitals and Clinics. 2015.

coordinator) found the coordinator to be highly helpful. Of the remaining respondents, about six percent reported that the coordinator was not helpful. In reviewing the comments on some of those who found the contact less than helpful, patients indicated that they could not fully remember the call. About 91 percent of patients also were able to schedule their follow-up appointments with their primary care provider (PCP) after being discharged, and of these patients, nine out ten thought their primary care provider was informed about their recent hospital stay. Among nine patients who were unable to schedule their appointments and provided reasons why this was so, they indicated that the delays were due to insurance, appointment cancellations, or not knowing they needed a follow-up. None of the respondents were contacted by the TCT via Skype.

About three-quarters of the participants rated their experience with the TCT program as very positive—a 9 or 10 on a scale of 1 to 10, while 90 percent rated their experience an eight or higher. We also found that among respondents who rated their experience with the TCT program lower than an eight (11), all of them had been contacted by a TCT coordinator in less than three days, while about 67 percent were contacted by a local coordinator and 60 percent indicated that their local doctor was informed about their hospital stay. As shown in Exhibit F.UIHC.1, the N size for each question is lower than the 118 respondents to the survey. This is because between 6 percent and 17 percent of patients did not answer some of the questions. For the questions on whether they were contacted by a TCT or local coordinator and if they scheduled a follow-up with their PCP, persons who did not respond mainly reported they could not recall the transition program. For questions whether their PCP was informed about their hospital stay and the overall rating of the transitional care program, about 40 percent of those who did not respond did not recall the program, while the remaining 60 percent indicated the response category, "Don't have an opinion/Refuse to answer."

Exhibit F.UIHC.1: U Iowa Consumer Experience Survey Items

Variable	Respondents % (N)
Contacted by TCT coordinator <3 days	92.9 (98)
Among persons contacted, TCT very or extremely helpful	71.9 (89)
Contacted by local coordinator	86.3 (102)
Among persons contacted, local coordinator very or extremely helpful	73.6 (87)
Scheduled follow-up with primary care provider	91.0 (111)
Primary care provider informed of hospital stay	89.1 (101)
Connected TCT team via Skype	0.0 (101)
Overall experience 8+	88.7 (97)
Overall experience 9+	72.2 (97)

NOTE: Except for questions on helpfulness of the coordinator, the N refers to the number of respondents who replied to the question from the 118 completed calls.

University of New Mexico

Survey of Consumer Experience

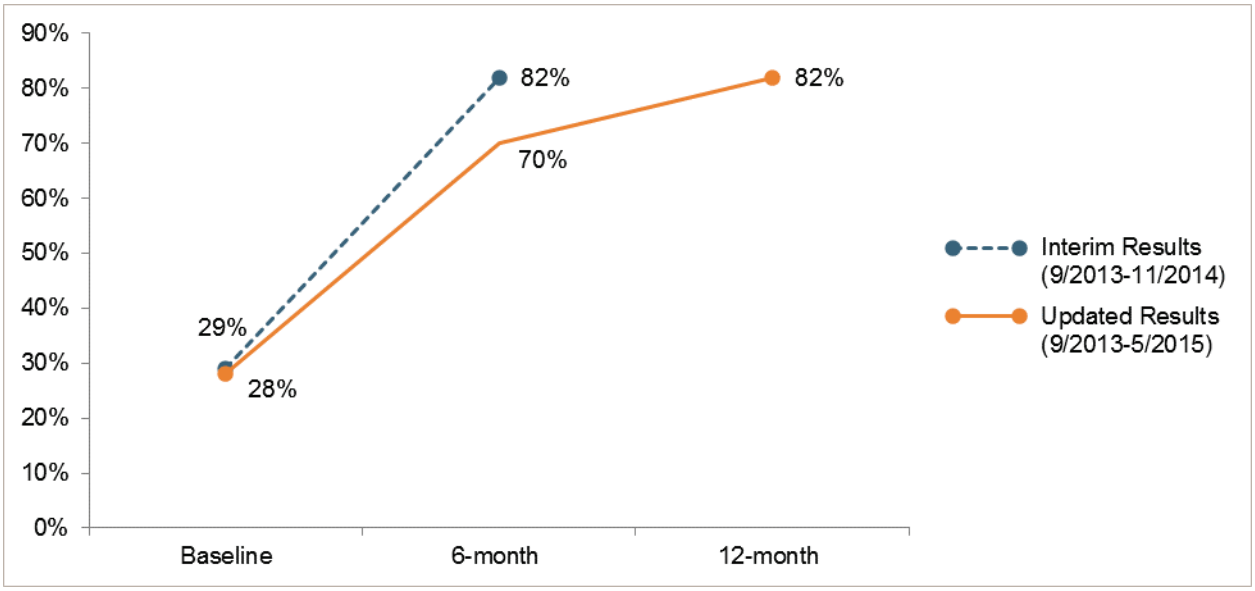
NORC presents survey results from ECHO Care's Patient Satisfaction Survey in our Second Annual Report to CMMI (2016), shared with us by the awardee; updated results since that time are presented

here. The survey is distributed to patients during clinic visits, and patients have the option to complete and return the survey at the time of their visit or at a later time by mail. Here we present survey results collected through May 2015, noting baseline (n=196) and 6-month follow-up (n=102) samples, as well as 12-month follow-up data (n=54).

Although Project ECHO has served at least 746 patients to date, successively smaller percentages of patients have completed the series of satisfaction surveys, which is typical of follow-up surveys. The awardee acknowledged that the diminishing response may be attributed in part to various challenges with survey data collection among their target population, including literacy concerns, and limited staff resources to support more robust data collection. The small sample sizes should be taken into consideration when drawing conclusions from the results, although we do observe some trends. Project ECHO reports survey findings for a singular response of interest for each question, thus NORC's discussion below mirrors this reporting structure,

As shown in Exhibit F.ECHO.1, ECHO Care patient satisfaction with care received in the past six months increased from the time of enrollment, when the responses referred to providers other than the ECHO Care primary care team, to six month follow-up. This substantial increase between baseline and 6-month survey holds true in the more recent data reported by the awardee. The proportion of respondents reporting that they were very satisfied with ECHO Care after 6 months was 70 percent, compared to the initial rate of 82 percent. Additional data collected at 12-month follow-up shows that satisfaction levels increase to 82 percent of respondents who say that they are very satisfied with their care over the previous six months.

Exhibit F.ECHO.1: Patient Satisfaction: Percentage of Respondents Very Satisfied



In the satisfaction survey, ECHO Care patients are also asked to report on various aspects of care planning and ways in which their primary health care (Outpatient Intensivist) team has been involved in their health care in the past six months. Overall, trends are positive from baseline to six- and 12-month

follow-ups. For example, more respondents indicate at the six-month follow-up (versus at baseline) survey that someone from their team has discussed health goals with them or asked them about things that make it hard for them to take care of their health; these positive increases have been consistent throughout data collection, with even more patients reporting at 12 months that they had these important discussions with their health care team (see Exhibit F.ECHO.2). A similar pattern of responses—a substantial increase in positive responses between baseline and the survey at six months, followed by a more modest increase at the 12-month follow-up, can be seen in the percentage of respondents who indicate that members of their team *always* seem to know the important information about their medical history and the percentage of respondents who go to a member of their team to ask for help when sick. Similar to ratings of satisfaction, however, there are some differences in care planning feedback over the data collection period. In the initial survey data (n=38), 61 percent of patients responded that they had been given a copy of their treatment plan at six months into the intervention, and in the subsequent data set (n=102), 50 percent of patients affirmed receiving a written treatment plan, increasing to 56 percent at the 12-month follow-up survey. The percentage of respondents who say they received enough education about their medical conditions to allow them to take care of their health remained stable at about 60 percent for the six- and 12-month follow-up surveys.

Exhibit F.ECHO.2: Consumer Survey Results on Care Planning, ECHO Care Program

Question	Interim Results % Respondents		Updated Results % Respondents		
	Baseline (N=78)	6-Month (N=38)	Baseline (N=196)	6-Month (N=102)	12-Month (N=54)
In last 6 months, did anyone on Primary Healthcare team talk with you about specific goals for health?					
Yes	47	84	47	86	89
In last 6 months, did anyone on Primary Healthcare team ask if there are things that make it hard to take care of your health?					
Yes	40	66	43	68	76
In last 6 months, how often did members of Primary Healthcare team know important information about medical history?					
Always	38	66	34	53	69
When sick, where usually go to ask for help?					
Member of their Primary Healthcare team	24	82	27	59	76
In last 6 months, given written copy of treatment plan?					
Yes	38	61	41	50	56
In last 6 months, received enough education about medical conditions to take care of health?					
Yes	36	68	40	61	60

Reports of care coordination also improve over time, with more respondents at follow-up indicating that their care was *always* well coordinated, compared with baseline reports. Furthermore, a greater percentage of respondents at follow-up than baseline report *never* getting conflicting advice from their various health care providers. These trends are observed in both interim and updated survey data, with more recent data showing improvements in these measures sustained at 12 months (see Exhibit F.ECHO.3).

Exhibit F.ECHO.3: Consumer Survey Results on Care Coordination, ECHO Care Program

Question	Interim Results % Respondents		Updated Results % Respondents		
	Baseline (N=78)	6-Month (N=38)	Baseline (N=196)	6-Month (N=102)	12-Month (N=54)
In last 6 months, how often care received was well coordinated?					
Always	31	66	28	56	67
In last 6 months, how often get conflicting advice from different health care providers?					
Never	37	66	39	53	55

Several items in the ECHO Patient Satisfaction Survey pertain to the quality of the relationship and interactions between the patient and their primary health care team. Patients provide feedback on their perceptions of trust, the amount of time their team spent with them, and genuine caring on behalf of the team, among other items. Like most survey data, the data for these measures show positive increases over time into the 12-month follow-up, with more modest improvements as the sample size grows (see Exhibit F.ECHO.4).

Exhibit F.ECHO.4: Quality of Relationship/Interactions with Primary Health Care Team, ECHO Care Project

Question	Interim Results % Respondents		Updated Results % Respondents		
	Baseline (N=78)	6-Month (N=38)	Baseline (N=196)	6-Month (N=102)	12-Month (N=54)
In last 6 months, feel you could trust Primary Healthcare Team members with medical care?					
Definitely	44	87	49	73	80
In last 6 months, how often did Primary Healthcare team members spend enough time with you?					
Always	33	66	30	62	74
In last 6 months, how often did Primary Healthcare team listen to you carefully?					
Always	42	76	38	70	80
In last 6 months, did you feel Primary Healthcare team members really cared about you as a person?					
Definitely	41	76	47	79	85
In last 6 months, how often did Primary Healthcare team use condescending, sarcastic, or rude tone or manner?					
Never	69	87	69	81	80
In last 6 months, how often did Primary Healthcare team interrupt when you were talking?					
Never	65	87	65	82	83

Survey of Workforce Experience

U New Mexico also designed and conducted a 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.

Appendix G: Methods, Qualitative

This appendix offers an update on primary data collection and analyses since NORC's second annual report to CMMI, covering the time period from June 2015 through June 2016, and details on qualitative data collection and analysis methods.

Interviews

During the spring of 2016 NORC conducted a 45 to 60 minute telephone interview with each of the 14 awardees with a no-cost extension, as described in the methods chapter of this report. NORC conducted these telephone interviews to learn about programmatic changes and progress since the previous site visits or telephone calls in the spring of 2015, and to discuss the awardee's plans for continuing their work following the end of HCIA funding.

The following topics were included in the interview protocol:

- Reflections on plans for the no-cost extension period
- Experiences implementing these plans (tasks, staffing, health IT, partnerships)
- Opportunities and challenges to sustaining, replicating, scaling the HCIA-funded innovation
- Contextual factors that influence prospects to sustain, replicate, scale
- Observed outcomes for enrollees and how these outcomes have been measured
- Impacts of no-cost extension activities on awardee, partners, other stakeholders
- Lessons learned and next steps anticipated for the period following the no-cost extension

For each interview, notes were taken by a team member and a recording made for the purpose of verifying notes. A clean set of notes was used as a resource for updating and fact-checking the case studies developed as part of NORC's Third Annual Report.

Qualitative and Mixed Methods Data Analysis

Theme-based coding of primary source materials (e.g., notes from interviews, focus groups and group discussions, and site visits; program documents) has been used to answer specific evaluation questions in the 23 awardee chapters as well as to develop cross-awardee analyses. Please see NORC's Second Annual Report for a detailed overview of the qualitative coding approach. The NORC teams used NVivo 10 to manage source materials, apply codes, and conduct analysis. Themes generated from the qualitative data will be considered in light of quantitative findings and used to interpret quantitative results. Both qualitative and quantitative analyses will be synthesized to answer the core research questions and to address the issue of scalability for all awardees.

For qualitative data, content analysis is used to develop themes within, between, and across the 23 awardees, each of which comprises a case study. To support analyses in this report, NORC constructed and completed a set of mixed methods debriefing memoranda, one per awardee, using a template. Each memo is an informal, structured set of observations and findings for internal use and presentation at a

weekly qualitative analysis meeting, for the purpose of facilitating shared learning across the three cohorts. The 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 answers in the evaluation. The debriefing memorandum tool includes the following domains: participants served, program model, evidence of program effectiveness, and evidence of implementation effectiveness, including sustainability and scaling. Each template domain includes space for summary quantitative, survey, and qualitative findings.

The debriefing memoranda and the preliminary table of observations are used, together with notes from telephone interviews, site visit notes, program documents and previous NORC reports to CMMI, to inform the development of theme-based analyses for the quarterly reports and to guide development of theme-based coded analyses. The process of completing the mixed methods debriefing memo began with a meeting convened with the awardee cohort leads and their counterparts in NORC's survey and quantitative teams.

After developing a complete Annual Report outline, NORC developed in-depth awardee chapter templates, to ensure consistency among each of the 23 awardee case studies. The templates mapped directly to the evaluation domains covered in the mixed-methods debriefing memorandum, as mentioned above. Cohort teams used the initial themes and analyses identified during the memorandum writing process for expansion in the categories of workforce development, context, and sustainability, replicability and spread. Updated analyses for quantitative and quality of care measures were outline based on the debriefing memorandum, to be expanded upon from the updated claims and survey data now available.

Following completion of draft awardee case study chapters, a front page summary was created for each awardee chapter, working from a template developed with guidance from CMMI. Each NORC cohort team drafted front page summaries for their respective cohort of awardees and presented these summaries in weekly qualitative team meetings, to receive feedback from colleagues across the qualitative team; on the basis of this feedback, revised summaries were prepared.

Appendix H: List of Evaluation Questions

Exhibit H.1: Evaluation Research Questions, HCIA Evaluation Statement of Work

Domain	Questions	Questions for CHRPT Cohort of Awardees
I. IMPLEMENTATION EFFECTIVENESS		
A. Program drivers		
1. Theory of change	What are the central processes or drivers in the innovation by which change in behavior and/or systems is supposed to come about? What implementation activities are designed to activate the innovation's theory of change?	What are the commonalities and differences among the various models posited by awardees? **Complex/High-Risk Portfolio**: What are the awardee theories of action that support the innovation theory of change for the complex/high risk target population? Which implementation activities are designed to activate the innovation's theories of change and of action?
2. Theory of action	What are the central processes or drivers in the innovation by which patient or system-level action is meant to come about?	
B. Intervention		
1. Components of the intervention	What intervention components (e.g., training and technical assistance) are provided in support of implementation? How much of each component is provided? To what extent were the components available on an ongoing basis? How did unexpected events support or conflict with successful implementation of the innovation?	How much of each component is provided and according to what schedule (e.g., one time, periodically)?
2. Dosage	What "dosage" of the innovation is *delivered* to patients, providers, and other target populations?	Does it differ among provider sites within an awardee's program? **Complex/High-Risk:** How does the "dosage" of intervention programs compare with the dosage provided from a usual source of care? How do variations in the dosage of the intervention that was delivered to the target population impact innovation award outcomes of health, health care, or costs, with health broadly defined to include well-being, function, and health-related quality of life?

Domain	Questions	Questions for CHRPT Cohort of Awardees
3. Fidelity	In what ways is the innovation intended to be customized to specific use contexts? To what extent were systems in place to monitor implementation on an ongoing basis? How well did providers and sites adhere to planned procedures (including, as appropriate, procedures for customization)? To what extent were the innovation and its components properly understood and used by target populations?	Were there unintended consequences as a result of deviations from program fidelity? **Complex-High Risk:** Did deviations in program fidelity occur for complex/high risk models? If so, to what degree did deviations from fidelity impact outcomes of health, health care, or costs (with health broadly defined)? What role did complex/high risk care recipient self-determination or informal caregiver preferences play in deviating from planned procedures?
		Modification to Intervention Did awardees and their delivery sites modify the interventions? To what extent did these modifications or variations in model affect quality, cost, or health outcomes? **Complex/High-Risk:** To what extent did patient self-determination or caregiver preferences account for deviations from planned procedures?
4. Self-monitoring	What changes were made in response to self-monitoring?	To what extent are systems in place to monitor implementation on an ongoing basis? **Complex/High-Risk:** Do awardees in the HCIA complex/high risk group use self-monitoring to make changes in their programs? Which approach or system do they use (e.g., process measures, outcomes analysis, CQI)? If so, what types of changes had a greater impact on outcomes (health, health care, or costs)?
C. Reach		
1. Coverage	What was the target population (e.g., patients, providers) after implementation? How many patients, providers were reached?	Did the program meet its proposed target enrollments of patients and trainees (relevant to evaluability/sample size)?
2. Timeliness of implementation	To what extent was implementation timely, conducted as planned, and responsive to site-level constraints?	
3. Secondary use of tools	What secondary uses, if any, were discovered for IT, decision support and other intervention tools? How could secondary uses be exploited to enhance benefits of the intervention(s) in other settings?	Were any of the interventions redeployed or adopted beyond their original proposed uses?

Domain	Questions	Questions for CHRPT Cohort of Awardees
		Assistive Technology **Complex/High-Risk:** Was assistive technology utilized in the implementation of complex/high risk models? What role did assistive technology play in implementing the innovation?
		Durable Medical Equipment **Complex/High-Risk:** What role did the use of durable medical equipment play in implementing the innovation?
II. PROGRAM EFFECTIVENESS		
A. Outcomes		
1. Health outcomes	To what extent does the intervention improve desired health outcomes? Does the intervention result in any unanticipated negative health outcomes? Does the intervention affect health outcomes that are most important to the target population? Can we learn anything about causal pathways? In particular, for interventions with multiple components, which aspects of the intervention are primarily responsible for observed effects?	To what extent does the intervention improve patient desired outcomes (satisfaction, support for patient's priority goals, confidence in care system), reported directly or via proxy? Does the impact of the intervention vary by population subgroup, e.g., Medicare only/dual eligible; disability status; age; race or ethnicity, geographic location?
2. HRQoL	To what extent does the intervention improve quality of life? Can we learn anything about causal pathways? In particular, for interventions with multiple components, which aspects of the intervention are primarily responsible for observed effects?	
B. Cost		
1. Program Costs	What were the fixed costs associated with program start-up? What are the variable costs associated with program operation? What are the anticipated new fixed costs associated with program sustainability?	**Complex/High-Risk:** Were aspects of the intervention or other services curtailed because of cost considerations? Were any curtailed because of regulations, anti-trust, or other policy-related considerations? What types of in-kind contributions to complex/high risk care occurred (e.g., informal caregiving and donated technology)?
2. Utilization	To what extent have levels of appropriate and inappropriate utilization changed? To what extent were there any unintended consequences for utilization? To what extent have levels of ED utilization changed? To what extent have rates of hospitalization and re-hospitalization changed? To what extent has intensity of inpatient utilization changed?	How do changes in utilization and improvements in care coordination vary among subgroups of patients?

Domain	Questions	Questions for CHRPT Cohort of Awardees
3. Expenditures	How are the models designed to reduce expenditures (e.g., changing the service the population utilizes, reducing the volume or utilization of services, changing the cost of services, etc.)? To what extent did the program change charges and expenditures for all care in the target population? To what extent did the program result in unintended charges and expenditures in the target population? To what extent do the models reduce or eliminate variations in charges or expenditures that are not attributable to differences in health status? What is the expected cost of sustaining these changes?	To what extent did the program change charges and expenditures for all care (including social supports) in the target population?
C. Quality		
1. Safety	To what extent do the models improve patient safety?	**Complex/High-Risk:** Which measures of patient safety are available or can be developed for complex/high risk patients in community settings that are innovating?
2. Clinical Effectiveness	To what extent do the models improve the effectiveness of patient care? To what extent have clinical condition indicators changed? To what extent does the intervention affect key performance goals, such as compliance with treatment guidelines?	
3. Patient experience	In what ways are aspects of patient experience (e.g., access, perceived care coordination, provider-patient communication, etc.) are enhanced by the intervention(s)? In what ways are aspects of patient experience worsened by the intervention? To what extent does the intervention affect measures of patient activation?	**Satisfaction with Care** How satisfied are patients with the care they receive?
		Informal Caregiver Experience **Complex/High-Risk:** In what ways are aspects of the patient's informal caregiver's experience (e.g., access, perceived care coordination, provider-patient communication) enhanced or worsened by the intervention(s)? In what ways are aspects of informal caregivers' experiencing face-to-face access, seamlessness of services, and provider communications affected by the interventions?

Domain	Questions	Questions for CHRPT Cohort of Awardees
4. Timeliness	To what extent do the models improve the timeliness of care?	**Complex/High-Risk:** To what degree did the timeliness of services to complex/high risk patients in a community setting impact patient outcomes? Was there perceived delay in receipt of services? In availability of needed service? Which aspects of timeliness impacted delivery of services of this set of awardees in the community?
5. Efficiency	To what extent do the models improve the efficiency of care?	
6. Care Coordination	To what extent did the models improve care coordination?	
D. Cross-Cutting Considerations		
1. Equity & Disparities	What contribution did the program make in reducing disparities in patient access to care? What contribution did the program make in reducing disparities in enrollment of targeted patients in intervention? To what degree do the model(s) result in reductions in or elimination of disparities in quality of care? To what degree does the program result in reductions in or elimination of disparities in patient outcomes? What program characteristics influenced reductions of disparities in access, quality, or outcomes?	
2. Subgroup effects	In outcomes of interest (health, costs, quality) for which a main effect was not detected, was there a subgroup in whom an effect was detected? In outcomes of interest (health, costs, quality) for which a main effect was detected, was there a subgroup of patients for whom the effect was stronger, weaker, or not detected? What were the characteristics of patients, providers, and settings in which a subgroup effect was detected? What characteristics of patients and settings influencing subgroup effects could be used to target the intervention(s) in other settings?	

Domain	Questions	Questions for CHRPT Cohort of Awardees
3. Spillover effects	What, if any, were the positive and negative spillover effects of the intervention(s)? · At site(s) /Among providers/Among non-targeted patients (through unintended effects on all services) · Among targeted patients (through unintended utilization of other beneficial services) What program characteristics and factors influenced these effects? To what extent did workflow redesign, HIT, telemedicine, and other structural aspects of the intervention result in spillover effects at the site(s) or among providers? To what extent did care coordination, patient navigators, shared decision making, and other aspects of the intervention(s) result in spillover effects among non-targeted patients? How can spillover effects be exploited in future implementation efforts using similar models of care?	
III. WORKFORCE		
A. Development & Training		
	To what extent do programs provide training to use existing staff versus incorporate new kinds of staff effectively? Are specialized providers required with training relevant to any of the diseases/systems being targeted? What level of investment in training is required to fill these workforce gaps? How effective and efficient are the various training models? Are providers given feedback on their own performance and relative to others?	**Complex/High-Risk:** To what degree do awardees employ competency-based training? If they do, what is the impact of competency-based training techniques on well-being, function, HRQOL? On costs? What is awardee retention of trainees in workforce? **Complex/High-Risk:** What can be learned from modifications in trainee roles and tasks after training that may inform workforce transformation, regulation, and policy?

Domain	Questions	Questions for CHRPT Cohort of Awardees
B. Deployment		
	To what extent do programs succeed in developing effective work teams that address care needs of the served populations? Are provider-to-provider interactions/discussions more frequent and effective? What is the most effective way to carry out the intervention with patients: to work with patients one-on-one (and in what settings) versus in groups? What are the best ways to contact patients? (both from the patient and the provider point of view) Are patients, themselves, trained on new behavior or interactions with information technology? How do the workers follow-up to ensure that the trainings stick with the patients (long-term adherence) Is it more effective to hire new workers or contract for a portion of the time of existing workers in other organizations (or freelance)? Are providers able to work at the 'top of their license'?	
C. Satisfaction		
	· How has the innovation changed the incidence of burnout among staff? · How has the innovation changed incidence of stress among staff? · What are current rates of staff intent-to-leave current practice? · How have rates of staff retention and turnover changed over the course of the innovation? · To what extent are different kinds and levels of staff satisfied or dissatisfied with the care they are able to provide? · To what extent are different kinds and levels of staff satisfied with their working conditions? This would include factors such as satisfaction with colleagues, other staff, income, organizational policies, etc. · To what extent do different kinds and levels of staff report satisfaction or dissatisfaction with specific components of the intervention? This would include components introduced as part of the intervention (e.g. a mobile computing platform; a new workflow process; support from community health workers). · How has staff satisfaction or dissatisfaction changed as a result of the intervention? · If the innovation is limited to a subgroup of staff/providers within an organization, what are the unintended consequences/spillover effects on the satisfaction of staff/providers *not* involved in the intervention?	

Domain	Questions	Questions for CHRPT Cohort of Awardees
IV. PRIORITY POPULATIONS		
A. Populations		
1. Medical priority groups	To what extent do the awardee interventions include patients from priority populations? To what extent do the awardee interventions address meeting the needs of priority populations as a primary focus? To what extent do the awardee interventions focus on addressing the needs of priority populations (e.g., functional limitations which would impact ability to manage conditions)?	Does the intervention affect health outcomes that are most important to the target population? What contribution did the program make in reducing disparities in patient access to care? **Complex/High-Risk:** To what degree do the complex/high risk patient models serve non- Medicare and Medicaid populations? (e.g., non-beneficiary populations: uninsured or private pay)?
2. Non-medical priority groups	To what extent do the awardees address non-medical priority groups and underserved populations? Were awardees able to increase access to care for non-medical priority groups and underserved populations, and how? In what types of care settings? Are there key underserved populations that were not included in the awardees' patient populations?	
B. Impact		
1.Cost reduction/savings 2. Clinical outcomes	What are the estimated cost savings, if any, among priority groups? What are the estimated health and health care (e.g., access, QoL, quality, care coordination) outcomes among priority groups?	
V. CONTEXT		
A. Endogenous factors		
1. Leadership	Was there a clearly designated champion/leader/point person(s) to oversee implementation? To what extent were "point-of-service" providers and/or patients involved in planning and implementing the innovation? How was the need for the innovation communicated to them? To what extent did senior management in the organization provide resources (e.g., staffing, time, funding) needed to implement the innovation? To what extent did implementation of the innovation involve coordination with outside stakeholders (e.g., units and/or organizations)?	
2. Team science	What were the key characteristics of the awardee team that would affect implementation of the innovation?	Are providers given feedback on their own performance and relative to others?
3. Organizational features	What were the unique characteristics of the awardee that affected the implementation and success of the innovation? What key assumptions are required concerning the host organizations' capacities? To what extent did organizational features support or conflict with implementation?	

Domain	Questions	Questions for CHRPT Cohort of Awardees
4. Stakeholder Engagement	To what extent did stakeholder engagement affect the relevance, transparency, or adoption of the innovation?	
B. Exogenous factors		
1.Policy/political environment	To what extent did the policy and political environment support or conflict with implementation?	
		Complex/High-Risk: What is the impact of community context on awardees' approaches to serving complex and high risk patients? What community supports enhance the interventions and which hinder implementation?

Appendix I: Cross- Awardee Chapter Exhibits

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

Awardee	Payer(s)	Older Adults with MCC	Adults with Functional Impairment and/or MCC	Adults with Behavioral Health or Substance Abuse Diagnosis	Adults with Late-Stage Disease	Adults living with I/DD	Children with Complex Health Conditions
BIDMC	Medicare	■					
CLTCEC	Medicare, Medicaid	■	■				
CCNC	Medicaid						■
CKRI	Medicare, Medicaid		■	■			
DDHS	Medicaid					■	
J-CHiP	Medicare, Medicaid	■	■	■	■		
JHU SON	Medicare, Medicaid	■					
LifeLong	Medicaid	■	■	■			
Northland	Medicare	■					
PCCSB	Medicare	■	■		■		
PRHI	Medicare	■			■		
PPMC	Medicaid	■	■	■			
SCRF	Medicare	■	■				
St Francis	Medicare	■	■				
Sutter Health	Medicare	■	■		■		
UEMS	Medicare, Medicaid	■	■				
UAMS	n/a	■					
U Iowa	Medicare	■	■				
U New Mexico	Medicaid		■	■	■		
U North Texas	Medicare	■			■		
URI	Medicaid					■	
UT Houston	Medicaid						■
VUMC	Medicare	■			■		
Totals		**17**	**12**	**5**	**7**	**2**	**2**

Exhibit I.2: Claims-Based Findings for Models that Serve Adult Medicaid Beneficiaries in Medicaid Expansion States, by Awardee

Awardee	Evaluation Design	Claims Data	Average Quarterly Impact [per 1,000 beneficiary-episodes for Hospital Design or per 1,000 beneficiaries for Community Design, unless noted]				
			CMMI Core Measures				Supplemental Measures
			Total Cost of Care, per beneficiary-episode (Hospital) or per beneficiary (Community)	Hospitaliza-tions	Emergency Department Visits	30-day Readmis-sions	Practitioner Follow-up Visits
J-CHiP	Hospital	Medicaid	-$4,987***	53**	-134***	■	-70*** (7 days post-discharge) -184*** (30 days post-discharge)
	Community	Medicaid	-$1,756***	-31***	-48***	-36**	
LifeLong§	Community	MediCal		-148***	-150***		
PPMC	Community (Health Resilience Program)	Medicaid	-$408**	■	■		
	Community (New Directions)	Medicaid	-$1,220**	■	-162***		
	Community (ED Guides)	Medicaid	-$381***	-15***	60***		
	Community (Standard Transitions)	Medicaid	-$1,081***	■	154***		
	Community (C-TRAIN)	Medicaid	-$681***	■	■		
UEMS	Community	Medicaid	-$717***	-15*	-143***		-69*** (90-day post-ED visit)
U New Mexico	Community	Medicaid	-$2,044***	■	■	■	

NOTE: *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance. §Claims-based data for costs not available for this awardee, and utilization outcomes are over 2 year time-period; please see awardee chapter for more information.

Exhibit I.3: Claims-Based Findings for Models that Target Dually-Eligible Medicaid Beneficiaries, by Awardee

Awardee	Evaluation Design	Claims Data[§]	Average Quarterly Impact [per 1,000 beneficiary-episodes for Hospital Design or per 1,000 beneficiaries for Community Design, unless noted]					
			CMMI Core Measures				Supplemental Measures	
			Total Cost of Care, per beneficiary-episode (Hospital) or per beneficiary (Community)	Hospitaliza-tions	Emergency Department Visits	30-day Readmis-sions	Ambulatory Care-sensitive Hospitaliza-tions	Practitioner Follow-up Visits
CLTCEC	Community	Medicare	$1,175***	■	■	■	■	
			-$1,522* [2-year]					
CKRI	Community	Medicare	■	■	■			
		Medicaid	-$1,943*	■	■			
J-CHiP	Hospital	Medicaid	-$4,987***	53**	-134***	■		-70*** (7 days post-discharge) -184*** (30 days post-discharge)
	Community	Medicaid	-$1,756***	-31***	-48***	-36**		
JHU SON	Community		■	■	■	■	■	
LifeLong[§§]	Community	MediCal		-148*** [2-year]	-150*** [2-year]			
Northland	Community	Medicare	■	■	23*	■	■	
PCCSB	Community	Medicare	■	-17**	-24***	■	■	
St. Francis	Hospital	Medicare	■	■	■	■		■
	Community	Medicare	■	■	■	■	■	
SCRF	Community	Medicaid	■	■	■	112*	■	

NOTE: *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. [§]Where claims data is noted to be Medicare, Medicaid claims data not available for use in analysis. ■ Indicates that finding does not reach statistical significance. [§§]Claims data on costs not available; please see awardee chapter for more information.

Exhibit I.4: Claims-Based Findings, Dually Eligible versus non-Dually Eligible Medicaid Beneficiaries, J-CHiP

Hospital Evaluation Design				Community Evaluation Design			
AVERAGE QUARTERLY IMPACT							
Outcome Measure (per 1,000 beneficiary-episodes unless noted)	**Adjusted Estimate**			**Outcome Measure (per 1,000 beneficiaries unless noted)**	**Adjusted Estimate**		
	All Medicaid (Pooled) (N=13,745 beneficiary-episodes)	**Dually Eligible (N=6,281 beneficiary-episodes)§**	**Medicaid Only (N=7,464 beneficiary-episodes)**		**All Medicaid (Pooled) (N=2,511 beneficiaries)**	**Dually Eligible (N=1,042 beneficiaries) §**	**Medicaid Only (N=1,469 beneficiaries)**
Total Cost of Care per beneficiary-episode ($)	-$4,987***	-$2,730***	-$7,954***	Total Cost of Care per beneficiary ($)	-$1,756***	-$1,041***	-$1,621***
Hospitalizations	53**		■	Hospitalizations	-31***		-29***
Emergency Department Visits	-134***	-86***	-153***	ED Visits	-48***	-56***	-44***
30-day Readmissions	■		■	Readmissions	-36**		■
7-day Practitioner Follow-up Visits	-70***		■	Potentially Avoidable Hospitalizations	-7***		■
30-day Practitioner Follow-up Visits	-184***		-111***				

NOTES: §For dually-eligible beneficiary-episodes or beneficiaries, impacts are presented only for total cost of care and ED visits, since Medicare is the primary payer for hospital and physician services for these beneficiaries. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance.

Exhibit I.5: Definitions, Advance Care Planning

Advance Care Planning (ACP). "The whole process of discussion of end-of-life care, clarification of related values and goals, and embodiment of preferences through written documents and medical orders. This process can start at any time and be revisited periodically, but it becomes more focused as health status changes. Ideally, these conversations (1) occur with a person's health care agent and primary clinician, along with other members of the clinical team; (2) are recorded and updated as needed; and (3) allow for flexible decision making in the context of the patient's current medical situation."

Advance Directive (AD). Any of "several types of patient-initiated documents, especially living wills and documents that name a health care agent. People can complete these forms at any time and in any state of health that allows them to do so." Typically, an advance directive consists of either or both of the following:

> **Living will.** ""a written (or video) statement about the kinds of medical care a person does or does not want under certain specific conditions (often 'terminal illness') if no longer able to express those wishes."
>
> **Durable power of attorney for health care.** "identifies the person (the health care agent) who should make medical decisions in case of the patient's incapacity."

Medical orders. "created with and signed by a health professional, usually a physician (in some states, a nurse practitioner or physician assistant), for someone who is seriously ill. Because they are actual doctor's orders, other health professionals, including emergency personnel, are required to follow them."

Physician Orders for Life-Sustaining Treatment (POLST) are "physician orders covering a range of topics likely to emerge in care of a patient near the end of life." These orders are authorized at the state level, and the specific name given to a POLST form varies from state to state; not every state has a legally binding POLST form. See the National POLST Paradigm website for more information, at http://www.polst.org/ (accessed 12.7.15).
Source: Institute of Medicine, 2014.

Exhibit I.6: Elements of Provider-Patient Communication in Advance Care Planning, by Awardee

Awardee	Recommended Practices in ACP Communication						
	Train clinicians	Identify patients at risk	Initiate conversations for outpatients (before crisis) or post-acute	Educate patients and families	Use a checklist or conversation guide, patient decision supports	Improve communication of critical information	Measure and report performance
BIDMC		■		■		■	
J-CHiP PAC	■	■	■	■	■	■	■
PCCSB		■	■	■		■	■
PRHI	■	■		■		■	
SCRF	■	■	■	■	■	■	■
Sutter Health	■	■	■	■	■	■	■
U New Mexico	■		■				
U North Texas		■	■	■	■	■	■
VUMC		■				■	
totals	5	8	6	7	4	8	5

Exhibit I.7: Best Practices in ACP, by Awardee

Awardee	Advance Directive (AD)		Update preferences on ongoing basis, more specific over time	Convert treatment goals into medical orders, portable & accessible, for those with late-stage illness	Make AD readily accessible within EHR	Promote AD completion & ACP with partners & stakeholders
	Designate health care surrogate	Initiate documenting patient preferences (goals of care, treatment options, care settings)				
BIDMC		■	■			
J-CHiP PAC		■	■			■
PCCSB	■	■		■		■
PPMC	■	■		■	■	
PRHI	■	■				
SCRF		■				
Sutter Health		■	■	■	■	■
U New Mexico		■	■			
U North Texas[§]		■	■	■	■	
VUMC	■	■	■	■		
totals	4	10	6	5	3	3

Note: Based on summary table in Institute of Medicine. 2014. Dying In America: Improving Quality and Honoring Individual Preferences near the End of Life. One of the IOM's criteria —that of ensuring access to an ethics committee or consult-–is not fulfilled by any of the awardees. [§]In one of the states (Florida) where the awardee is implementing its HCIA-supported intervention, there is no state-sanctioned mechanism for creating legally binding medical orders.

Exhibit I.8: Claims-Based Findings for Models that Include Advance Care Planning, by Awardee

Awardee	Evaluation Design	Claims Data	Outcome Measures [per 1,000 beneficiary-episodes for Hospital Design or per 1,000 beneficiaries for Community Design, unless noted]					
			CMMI Core Measures				Supplemental Measures	
			Total Cost of Care, per beneficiary-episode (Hospital) or per beneficiary (Community)	Hospitaliza-tions	Emergency Department Visits	30-day Readmis-sions	Ambulatory Care-sensitive Hospitalizations	Practitioner Follow-up Visits Post-discharge
BIDMC	Hospital	Medicare	■	■	■	■		23** [30 days post]
J-CHiP	Hospital	Medicare	-$1,115*	11*	■	14**		-41*** [7 days post] -29*** [30 days post]
		Medicaid	-$4,987***	53**	-134***	■		-70*** [7 days post] -184*** [30 days post]
Northland	Community	Medicare	■	■	23*	■	■	
PCCSB	Community	Medicare	■	-17**	-24***	■		
PRHI	Hospital	Medicare	■	■	-26* (180 days post-discharge)	■		68*** [7 days post] 33*** [30 days post]
PPMC	Community (C-TRAIN arm)	Medicaid	-$681***	■	■			
SCRF	Community	Medicare	■	■	■	112*	■	
Sutter Health	Community, End of Life	Medicare	-$5,657***	-71***	28***			
U New Mexico	Community	Medicaid	-$2,044***	■	■	■		
U North Texas	Hospital (SNF)	Medicare	-$449** [30-day]	■	■	■		
	Community (AL/MC)	Medicare	-$1,095***	-26***	■	-336*	-6*	
	Community, End of Life	Medicare	-$861*** [30-day] -$2,122*** [90-day]	■	■			
VUMC	Hospital	Medicare	■	■	-70* [count variable]	■		58***
	Community, End of Life	Medicare	■	■	■			

NOTE: *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance.

Exhibit I.9: Claims-Based Findings for Models that Target Beneficiaries with Behavioral Health and/or Substance Abuse Diagnosis, by Awardee

Awardee	Evaluation Design	Claims Data	Average Quarterly Impact, per 1,000 beneficiaries unless noted					
			CMMI Core Measures				Supplemental Measures	
			Total Cost of Care per beneficiary	Hospitaliza-tions	Emergency Department Visits	Readmissions	Ambulatory Care-sensitive Hospitaliza-tions	Practitioner Follow-up Visits
CKRI	Community	Medicare	■	■	■			
		Medicaid	-$1,943*	■	■			
J-CHiP	Hospital[§§]	Medicare	-$1,115**	11*	■	14***		-41*** [7-day post-discharge] -29*** [30-day post-discharge
		Medicaid	-$4,987***	53*	-134***	■		-70*** [7-day post-discharge] -184*** [30-day post-dicharge]
	Community	Medicare	■	-17***	-16*	■	■	
		Medicaid	-$1,756***	-31***	-48***	-36**		
LifeLong[§]	Community	MediCal		-148***	-150***			
PPMC	Community (Health Resilience Program)	Medicaid	-$408**	■	■	■		
	Community (New Directions)	Medicaid	-$1,220**	■	-162***			
	Community (ED Guides)	Medicaid	-$381***	-15***	60***			
	Community (Standard Transitions)	Medicaid	-$1,081***	■	154***			
	Community (C-TRAIN)	Medicaid	-$681***	■	■			
U New Mexico	Community	Medicaid	-$2,044***	■	■	■		

NOTES: *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance. §§ Measures are per beneficiary-episode (cost of care) or per 1,000 beneficiary-episodes

Exhibit I.10: Claims-Based Findings for Models that Serve Beneficiaries with Intellectual and/or Developmental Disability, by Awardee

Awardee	Evaluation Design	Claims Data	Average Quarterly Impact, per 1,000 beneficiaries unless noted [90% Confidence Interval]				
			CMMI Core Measures				Supplemental Measures
			Total Cost of Care per beneficiary	Hospitali-zations	Emergency Department Visits	Readmissions	Ambulatory Care-sensitive Hospitalizations
DDHS	C	Medicare	■	■	■	■	■
		Medicaid	■	■	-57** [-102, -12]	■	
URI	C	Medicare	$2,360** [$566, $4,154]	■	■		■

NOTES: *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance.

Exhibit I.11: Claims-Based Findings for Models that Include Lay Health Worker, by Awardee

Awardee	Evaluation Design	Claims Data	Average Quarterly Impact, per 1,000 beneficiaries unless noted					
			CMMI Core Measures				Supplemental Measures	
			Total Cost of Care per beneficiary	Hospitalizations	Emergency Department Visits	Readmissions	Ambulatory Care-sensitive Hospitalizations	Practitioner Follow-up Visits
CKRI	Community	Medicare	■	■	■			
		Medicaid	-$1,943*	■	■			
J-CHiP	Community	Medicare	■	-17***	-16**	■		
		Medicaid	-$1,756***	-31***	-48***	-36**		
LifeLong[§]	Community	MediCal		-148***	-150***			
UEMS	Community	Medicaid	-$717***	-15*	-143***			-69*** (90-day visits)
U New Mexico	Community	Medicaid	-$2,044***	■	■	■		
URI	Community	Medicare	$2,360**	■	■		■	

NOTE: CCNC uses lay health workers (patient coordinator) in its model but does not have claims-based findings. *p<0.10, **p<0.05, ***p<0.01. Full set of claims-based findings, including 90 percent confidence intervals, is available in the awardee chapters. ■ Indicates that finding does not reach statistical significance. [§]Measures for hospitalizations and emergency department visits are for 2 year period post-enrollment.