



Higher Quality at Lower Cost: Community Health Worker Interventions in the Health Care Innovation Awards

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# Higher Quality at Lower Cost: Community Health Worker Interventions in the Health Care Innovation Awards

## Abstract

**Background:** Published evidence regarding cost savings, reduced utilization, and improved quality associated with employing community health workers (CHWs) is largely lacking. This paper presents findings from the Centers for Medicare & Medicaid Services Health Care Innovation Awards (HCIA), with a focus on six diverse programs that employ CHWs. We examine outcomes associated with programs incorporating CHWs into care teams for a broad age range of patients with various health issues such as cancer, asthma, and complex conditions.

**Methods:** This mixed-methods study used data from claims and site visits to assess the effectiveness of CHW programs. In difference-in-differences analyses of Medicare fee-for-service and Medicaid claims, we compared utilization and spending for beneficiaries participating in each CHW program with propensity score matched non-participant beneficiaries for baseline (2010 – 2012) and post-intervention (2013 – 2016). We adjusted for geographic area, prior utilization, and clinical and sociodemographic characteristics. We assessed changes in care quality through beneficiary focus groups and interviews with program leadership and staff.

**Results:** Five of the six programs saw a significant reduction in utilization and/or spending relative to a comparison group, and all programs had positive qualitative findings regarding quality of care. In three of the six programs, the adjusted total cost of care was significantly reduced (-\$143 to -\$2,044 per beneficiary quarter). We hypothesize that some reductions in spending can be attributed to CHWs' provision of enhanced access outside of regular clinic hours, which facilitated patient adherence to evidence-based treatment pathways and averted unnecessary ED visits and hospitalizations. Culturally competent CHW encounters engaged patients in health care decisions, generated confidence in their decisions, encouraged adherence to treatment pathways, and mitigated social barriers to care.

**Conclusions:** Programs were associated with improved quality and reductions in health care utilization and spending up to \$20,000 per patient over the three-year period. Findings suggest a strong business case for the use of CHWs as part of interdisciplinary teams as CHW programs can provide a significant return on investment for payers. Reimbursement policies that do not account for the services of non-clinical staff such as CHWs impede the sustainability and spread of these interventions, despite mounting evidence of CHWs' effectiveness. Organizations looking to integrate CHWs into care delivery may conduct feasibility assessments of available workforce and the capacity for clinical oversight, physician buy-in, and funding sustainability. Established programs could be leveraged for mentorship.

## Keywords

health disparities; health care innovation; community health workers; care coordination; patient navigation

## Cover Page Footnote

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### **ABSTRACT**

**Background:** Published evidence regarding cost savings, reduced utilization, and improved quality associated with employing community health workers (CHWs) is largely lacking. This paper presents findings from the Centers for Medicare & Medicaid Services Health Care Innovation Awards (HCIA), with a focus on six diverse programs that employed CHWs. We examine outcomes associated with programs incorporating CHWs into care teams for a broad age range of patients with various health issues such as cancer, asthma, and complex conditions.

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**Results:** Five of the six programs saw a significant reduction in utilization and/or spending relative to a comparison group, and all programs had positive qualitative findings

regarding quality of care. In three of the six programs, the adjusted total cost of care was significantly reduced (-\$143 to -\$2,044 per beneficiary quarter). We hypothesize that some reductions in spending can be attributed to CHWs' provision of enhanced access outside of regular clinic hours, which facilitated patient adherence to evidence-based treatment pathways and averted unnecessary ED visits and hospitalizations. Culturally competent CHW encounters engaged patients in health care decisions, generated confidence in their decisions, encouraged adherence to treatment pathways, and mitigated social barriers to care.

**Conclusions:** Programs were associated with improved quality and reductions in health care utilization and spending up to \$20,000 per patient over the three-year period. Findings suggest a strong business case for the use of CHWs as part of interdisciplinary teams as CHW programs can provide a significant return on investment for payers. Reimbursement policies that do not account for the services of non-clinical staff such as CHWs impede the sustainability and spread of these interventions, despite mounting evidence of CHWs' effectiveness. Organizations looking to integrate CHWs into care delivery may conduct feasibility assessments of available workforce and the capacity for clinical oversight, physician buy-in, and funding sustainability. Established programs could be leveraged for mentorship.

**Keywords:** community health workers, cost of care, health disparities, care coordination, patient navigation

## INTRODUCTION

Despite substantial efforts to minimize health disparities by programs such as Medicare and Medicaid, disparities based on economic and demographic factors remain entrenched (Barr, 2014). Lower-income patients, especially rural and inner city residents, face challenges in accessing care (Brems, Johnson, Warner, & Roberts, 2006). Health gains usually occur in tandem for disadvantaged and more advantaged groups, leaving disparities intact. However, success in erasing some racial-ethnic disparities among children, such as vaccination rates, indicates that it is possible to reduce or eliminate disparities (AHRQ, 2015).

Although some patients may appear unwilling to follow health recommendations, many have low health literacy, leading to difficulties in understanding and acting upon health information. These patients may not comprehend the importance of medications, follow-up appointments, a healthy diet, or regular exercise (Coulter, 2012; Batterham, Hawkins, Collins, Buchbinder, & Osborne, 2016). In addition, patients may have needs or values that conflict with providers' evidence-based advice (Hoffmann, Montori, & Del Mar, 2014). Compared to those patients less engaged in their care, patients actively involved in their care use services more appropriately, practice healthier behaviors, and experience better outcomes (Hibbard & Greene, 2013). Many health organizations strategize to engage patients and encourage shared decision making, but providers' lack of time can preclude such tactics in clinical settings (Friedberg, Van Busum, Wexler, Bowen, & Schneider, 2013). Patient engagement and corresponding benefits can be facilitated through community health workers (CHWs) working in conjunction with a clinical team.

A CHW is a front-line worker and trusted member of a patient's care team who has a close relationship to the community served (U.S. Bureau of Labor Statistics, 2015). CHWs understand needs and norms in populations they serve and often establish rapport with patients more easily

than do clinicians. CHWs serve patients, caregivers, and families through psychosocial support, addressing health through education and goal setting, facilitating access to health and social services, and promoting adherence to treatment plans (Justvig S. P., 2017). Cultural and linguistic competencies can engender trust, often through face-to-face visits in familiar settings, such as participants' homes. Understanding community values lends expertise in addressing needs, and CHWs may thus be well-suited to working with those who are lower-income, have barriers (e.g., low literacy, unreliable transportation) to accessing care, lack health insurance, are racial-ethnic minorities, or live in rural areas (Islam N. N.-S., 2015).

Trust that CHWs build with both clinical teams and patients allows them to serve as liaisons, improving communication and care delivery (Justvig et al., 2017). Ideally, CHWs build patient capacity for self-care while increasing health knowledge, reducing stress, and improving clinical interactions (Liebhaber, Draper, & Cohen, 2009; Spaulding, Gamm, Kim, & Menser, 2014). Because decades of research indicate CHWs can improve care access and health outcomes (Perry, Zulliger, & Rogers, 2014), national recommendations promote expansion of CHWs' roles and scope (Dankwa-Mullan, et al., 2010). However, because studies do not always tie CHW engagement to cost reductions across populations and diseases (Neumann, Cohen, & Weinstein, 2014), many insurers do not reimburse for CHW services (Islam et al, 2015).

In this mixed methods study, we assess the impact of six CHW programs on Medicare and Medicaid spending and on program participant- and caregiver-reported experiences. As part of NORC at the University of Chicago's multiyear evaluation of the Health Care Innovation Awards of the Centers for Medicare & Medicaid Services (CMS), this study focuses on six programs that utilized CHWs to reach patients of diverse ages with a range of diseases and located rural and urban communities in different states across the U.S. Despite variations in populations served, each model leveraged trained CHWs who engaged in culturally competent interactions to support patient-centered care within and outside clinical settings. Rather than considering a single program as most previous studies have done this study aims to explore the ways in which diverse programs demonstrate CHWs' effectiveness across multiple conditions, geographies, populations, and institutional cultures and the financial efficacy of including them as a staple of health care interventions.

#### Community Health Worker Program Models

In the HCIA programs, CHWs typically filled multiple roles that usually evolved throughout implementation. Generally, CHW roles in the six programs corresponded with categories from Health Resources and Services Administration's definitions (Deutsch, et al., 2012):

- Member of Care Delivery Team – “renders direct services collaborating with medical professionals”
- Navigator –helps patients understand and maneuver the healthcare system
- Screening and Health Education Provider –focuses on delivering screenings and education
- Community Organizer – promotes “community action and build community support”

Most CHWs provided navigation, screening, and health education, often serving as the main point of contact between participants and other program staff. In addition, CHWs at all programs conducted home visits. University of Alabama at Birmingham's Patient Care Connect (PCC) and University Emergency Medical Services' Better Health through Social and Health Care Linkages beyond the Emergency Department (HealthiER) program CHWs worked

primarily as navigators in medical settings (e.g., emergency departments, clinics). Four programs—Le Bonheur’s Changing High Risk Asthma in Memphis through Partnership (CHAMP) program, Nemours’s Optimizing Health Outcomes for Children with Asthma in Delaware Project (OHOCAD), Indiana University’s Aging Brain Care (ABC) and University of New Mexico’s Extension for Community Healthcare Outcomes Care (ECHO)—prioritized integrating CHWs into clinical teams.

As shown in Table 1, CHW program models differed in terms of population of focus, scale, scope, and staffing. The six intervention programs spanned nine states and included rural, urban, and suburban areas. Each program employed between five and 34 CHWs, and served between 450 and 4,000 participants. Le Bonheur’s CHAMP program and the Nemours OHOCAD program served children under age 16; ECHO and HealthiER served adults aged 18 to 60; and ABC and PCC primarily served those 65 and older. The CHAMP, OHOCAD, HealthiER and ECHO programs targeted Medicaid beneficiaries, while PCC and Indiana University’s Aging Brain Care (ABC) programs focused primarily on Medicare beneficiaries.

Table 1. Description of CHW Program Models

Model	Disease Focus	Description	CHW Role	Number of CHWs
<b>ABC</b> <b>(n=1,120)</b> <i>Indiana</i>	Dementia and/or depression	Indiana’s ABC Program provided individualized and integrated care management through a multidisciplinary care team staffed by care coordinators and care coordinator assistants. The care teams assessed the participant’s needs and delivered ongoing monitoring and patient education on self-management through home visits and other types of patient interaction.	Contacted potential participants to enroll them in the program; conducted home visits to assess patients’ health status, monitored medication and adherence, and delivered certain care protocols; served as a liaison between the patient and other members of the care team	15

<b>Model</b>	<b>Disease Focus</b>	<b>Description</b>	<b>CHW Role</b>	<b>Number of CHWs</b>
<b>CHAMP</b> (n=476) <i>Tennessee</i>	Pediatric asthma	The CHAMP program included an inter-agency asthma collaborative and a focus on care management throughout the intervention. Le Bonheur created a pediatric asthma registry to inform evidence-based treatment. Asthma specialists developed care plans for participants after their initial visit to the CHAMP clinic. Asthma care coordinators and community health workers enrolled participants in the registry, oriented caregivers, assessed home conditions, and encouraged medication adherence.	Linked families with social service supports and resources and conducted home visits to enroll new patients, monitored medication adherence, reinforced asthma education, and administered environmental assessments	5
<b>OHOCAD</b> (n=490) <i>Delaware</i>	Pediatric asthma	Nemours developed a registry of high-risk asthma patients and deployed CHWs to provide support to the families of children added to the registry by addressing social needs, performing environmental home assessments, providing asthma education, and promoting medication adherence.	Provided case management, home visits, and asthma management coaching to families with at least one child with asthma	13
<b>PCC</b> (n=4,038) <i>Alabama, Florida, Georgia, Mississippi, Tennessee</i>	Cancer	PCC provided coordinated oncology care by employing a workforce of lay navigators to expand comprehensive cancer care support services.	Provided information and support to cancer patients in overcoming barriers to receiving care; served as liaison between patient and providers to ensure all patient needs are being addressed; assisted patients in identifying community resources	34



<b>Model</b>	<b>Disease Focus</b>	<b>Description</b>	<b>CHW Role</b>	<b>Number of CHWs</b>
<b>HealthiER</b> (n=839) <i>New York</i>	Multiple chronic conditions	HealthiER used a team of CHWs to engage frequent patients at the emergency department in developing their own health goals and care plans, navigating the health care system for primary and specialty care, and facilitating referrals to social and related services.	Recruited and screened prospective patients; engaged with patients for intake and assessment; developed a service plan based on patient-centered goals; facilitated access to care, transportation and social services; provided phone access at all times to CHWs; and in-home coaching and education to help patients manage their own health and health care	10
<b>ECHO</b> (n=553) <i>New Mexico</i>	Multiple chronic conditions	ECHO was 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.	Led respective teams in addressing social factors of health that impede access to care	8

## **METHODS**

### Quantitative Methods

Our study population included participants enrolled in any of six programs for any period from July 2012 through March 2016 and matched comparators. Our sample included over 7,000 program participants from vulnerable populations and matched comparators who sought care from 2010 through 2016. Table 2 summarizes participant characteristics.

Table 2. Descriptive Characteristics of Participants across CHW Programs

	<b>ABC</b> % (N)	<b>CHAMP</b> % (N)	<b>OHOCAD</b> % (N)	<b>PCC</b> % (N)	<b>HealthiER</b> % (N)	<b>ECHO</b> % (N)
<b>Number of participants</b>	1,120	476	490	4,038	839	553
<b>Gender</b>						
Female	75.7% (848)	38.9% (185)	36.5% (179)	55.5% (2,242)	57.8% (485)	50.8% (281)
<b>Age</b>						
Under 18	0	100% (476)	100% (490)	0	0	0
18-39 years	0	0	0	0	53.8% (451)	6.3% (35)
40-59 years	1% (11)	0	0	0.2% (10)	40.3% (338)	92.4% (511)
60 and older	99% (1,109)	0	0	99.8% (4,028)	6.0% (50)	1.3% (7)
<b>Race/Ethnicity</b>						
White	69.2% (775)	4% (19)	23.1% (113)	84.3% (3,405)	18.6% (156)	67.6% (374)
Black	29.4% (329)	83.2% (396)	69.0% (338)	14.0% (567)	0	3.4% (19)
Hispanic	0	0	7.6% (37)	0.2% (8)	3.8% (32)	24.1% (133)
Other	0.4% (5)	0	0.4% (2)	1.4% (58)	0	4.9% (27)
Unknown	1% (11)	13% (61)	0	0	78% (651) ±	0

**Comorbidity: Chronic Illness and Disability Payment System (CDPS - Medicaid) or Hierarchal Condition Categories (HCC – Medicare)**

Risk Score (Standard Deviation)	1.6 (1.2)	1.7 (1.2)	2.1 (3.5)	N/A	2.1 (2.2)	7.0 (1.9)
	<i>Mean HCC Score</i>		<i>Mean CDPS score</i>		<i>JEN Frailty Index</i>	

**Utilization in Year Prior to Enrollment**

Hospitalizations per 1,000 (SD)	445 (931)	391 (713)	145 (480)	642 (1,081)	545 (1,862)	1,553 (2,365)
ED Visits per 1,000 (SD)	1,422 (221)	2,979 (2,279)	1,298 (1,793)	936 (2,109)	4,757 (8,822)	2,128 (1,226)
Total Cost (SD)	\$11,447 (\$20,987)	\$7,360 (\$7,529)	\$5,769 (\$9,888)	\$22,95 (\$26,974)	\$8,656 (\$14,313)	--

Notes. ±HealthiER analysis used New York alpha-max data which had limited available information on race and ethnicity. The NORC institutional review board approved this research.

Using program-provided files with dates and participant names, we linked each participant to Medicare fee-for-service (FFS) claims files (PCC, Indiana) or Medicaid Alpha-Max (HealthiER, OHOCAD) in the Centers for Medicare & Medicaid Services Chronic Conditions Warehouse, or to state Medicaid data for New Mexico (ECHO) and Tennessee (CHAMP). All sources contain enrollment, cost, and utilization data.

We developed comparison groups through propensity score models, with variables selected in consultation with program research teams and disease-specific experts. The three-step process involved:

- selecting an area comparable to the program site;
- using each program’s clinical criteria for enrollment to limit the pool to qualified patients;
- employing propensity score methods to match treatment and comparison groups on potential confounding factors (e.g. demographics, comorbidities, prior health care utilization).

We limited the sample to patients with at least three chronic conditions for HealthiER and ECHO using JEN’s frailty index for Medicaid (De Jonge, et al., 2014), dementia and/or depression for ABC and cancer for PCC using hierarchal condition categories (HCC) scores for Medicare, and pediatric asthma for CHAMP and OHOCAD using the chronic illness payment system (CDPS) for Medicaid; all scores were based at time of enrollment.

We used difference-in-difference (DID) analysis for each participant and matched comparator using data for two years prior to program implementation and up to three years after a participant’s enrollment. Analyses examined total Medicare or Medicaid expenditures, hospitalizations, and emergency department visits.<sup>1</sup> Negative numbers in findings indicate

<sup>1</sup> The stated outcome measures were selected by CMS for their uniformity. We use these measures, as they are calculated in a similar way across all programs.

favorable results relative to comparison groups. Cost outcomes are continuous, measured as change in average total expenditures per participant and presented as dollars per participant per quarter. Hospitalizations and ED visits are binary (e.g., hospitalization or not), measured as the change in utilization rate and presented per 1,000 participants per quarter.

We conducted all statistical analyses using Stata 13.1. DID compares average outcomes between patients in the treatment and comparison group across the entire pre- and post-intervention periods. Our DID model estimated the average treatment effect on the treated using generalized linear models for total Medicare or Medicaid expenditures and logit models with robust standard errors to report utilization outcomes. All models were adjusted for demographics (age, race, gender, dual eligibility), comorbidities (disability, HCC risk score), and prior year cost and utilization. Conclusions drawn from these models were robust to alternative specification (e.g., count outcomes).

### Qualitative Methods

We conducted two rounds of in-person site visits between March 2014 and December 2015. On the first round of site visits, evaluators conducted semi-structured interviews with representative program staff and partners including program leaders, champions, frontline staff, and data teams. Interview questions were adapted from research domains developed by a meta-evaluator and implementation contractor evaluating the entire HCIA initiative (Berry, et al., 2013; Guidance for front line evaluators: Health Care Innovation Awards (Internal Report), 2014). These domains were thus well suited to evaluate programs with different intervention models. Interview protocols included questions on program implementation, program effectiveness, workforce experiences, and internal and external contexts. During the second round of site visits, evaluators sought to update their understanding of the program, document model fidelity or implementation changes, and better understand program impacts and impact drivers. In total, qualitative data included interviews with 67 CHWs, 203 program leaders and staff, and focus groups with 205 caregivers and participants. In addition, programs submitted quarterly self-reports and information about staff size, recruitment, and retention; these reports informed interview protocol development and enhanced researchers' understanding of programs between site visits.

Following site visits, researchers cleaned interview and focus group verbatim notes, and then coded them using NVivo (QSR International Version 10). Codes aligned with interview protocol themes and covered the major research domains described above. When possible, researchers who attended site visits cleaned and coded notes from those respective programs. Inter-rater reliability was established and the codebook refined before researchers began coding independently. Continuous consensus-building discussions after training also ensured high quality coding. For this analysis, researchers reviewed data under CHW-related codes, systematically identified relevant sub-themes, and consulted with subject matter experts on the evaluation team to develop findings.

## **RESULTS**

### Quantitative Results

The results of DID analyses found that all but one of the six programs showed a significant reduction in at least one study measure (see Table 3). CHAMP, HealthiER, and ECHO showed significant quarterly reductions in cost ranging from -\$143 per patient per quarter (95 percent CI: -\$263, -\$24) to -\$2,044 per patient per quarter (95 percent CI: -\$2,968, -\$1,120). CHAMP and HealthiER also showed significant reductions in ED visits per quarter. Although OHOCAD and

PCC did not demonstrate significant cost reductions, their participants had significantly fewer ED visits and hospitalizations.

Table 3. Difference-in-differences Estimates for Measures of Utilization and Cost  
 Average Quarterly Impact

Program	Hospitalizations per 1,000 patients per Quarter	ED Visits per 1,000 patients per Quarter	Total Cost of Care per Patient per Quarter
ABC	4 [-14, 6]	2 [-12, 16]	\$60 [-\$311, \$431]
CHAMP	-8 [-19, 3]	<b>-39 [-67, -11]**</b>	<b>-\$536 [-928, -143]**</b>
OHOCAD	<b>-10 [-19, -1]*</b>	<b>-33 [-61, -5]**</b>	\$16 [-\$174, \$205]
PCC	<b>-11 [-18, -4]**</b>	<b>-22 [-30, -14]***</b>	-\$37 [-\$418, \$344]
HealthiER	2 [-8, 12]	<b>-40 [-56, -23]***</b>	<b>-\$143 [-\$263, -\$24]**</b>
ECHO	-16 [-39, 7]	13 [-19, 45]	<b>-\$2,044 [-\$2,968, -\$1,120]***</b>

Notes. \*\*\* p<0.01; \*\* p<0.05; \* p<0.1 for statistical significant versus a comparison group of similar patients.

### Qualitative Results

*Patient Experience.* Qualitative data analysis assessed participants’ and caregivers’ reported experiences when their care team included CHWs. Across all programs, interventions, and populations, participants and caregivers reported positive impacts on both quality of care and their quality of life. Several emergent themes from the qualitative analysis illuminate potential paths to favorable utilization and cost outcomes. Table 4 highlights five major areas of patient and caregiver-reported improvements: health care access, decision-making confidence, adherence to treatment, addressing social determinants of health, and reduced caregiver burden. CHWs typically came from communities they served, understood social contexts, spoke the same language as participants, and were often available outside of clinical settings. CHWs’ personal relationships with participants and caregivers facilitated care improvements. An ECHO participant said, “When someone visits your home, it humanizes you. Before this, I was just a number. They give you better care if they can see your face.” For some rural residents, CHWs provided some of the only social interactions participants had. Trust built from early CHW interactions facilitated bonds that appeared to enhance interventions’ clinical impacts. As an Indiana program informant noted, “[E]ven more so than some of the clinicians ... [CHWs] just develop such a rapport with the patient and the caregiver.”

Table 4  
*Participant and Caregiver-reported Improvements*

<b>Program</b>	<b>Improved Health Care Access</b>	<b>Improved Confidence in Decision-Making</b>	<b>Adherence to Treatment Pathways</b>	<b>Addressing Social Determinants of Health</b>	<b>Reduced Caregiver Burden</b>
<b>ABC (n=42)</b>	•			•	•
<b>CHAMP (n=21)</b>	•	•	•	•	•
<b>OHOCAD (n=52)</b>	•	•	•	•	•
<b>PCC (n=62)</b>	•	•	•	•	•
<b>Healthi-ER (n=17)</b>	•			•	
<b>ECHO (n=11)</b>	•			•	

*Notes.* Data source is focus groups and interviews with patients and caregivers.

Across all programs, participants and caregivers reported improved access to health care. CHWs served as a bridge to primary care and ensured timely and appropriate care. CHWs appeared to be instrumental in participants’ optimal use of medical resources. For instance, ABC CHWs shared notes from visits with clinical teams and followed up with participants to ensure adherence to evidence-based pathways. HealthiER CHWs helped participants find a primary care provider and schedule an appointment after an ED visit. CHWs at PCC and OHOCAD were available after hours to assess disease exacerbations to determine if a participant needed immediate medical care, helping to avoid unnecessary ED visits. PCC CHWs made calls to Medicare to assess benefits and assisted in reimbursement paperwork. One CHAMP caregiver said, “The CHW and others are partners in every area of your life... They keep records, they educate you ... anything you need. I feel like [the program] has probably saved me as a parent because I was just tired.”

Family members at CHAMP, OHOCAD, and PCC cared for different age groups, but all reported improved confidence in decision-making and increased ability to follow treatment pathways as a result of CHW support. Prior to joining the programs, most caregivers at CHAMP and OHOCAD did not have an established asthma treatment plan. After receiving CHW services, caregivers in both programs reported that they better understood how to manage asthma.

Increased confidence appeared to empower caregivers to follow physician-designed treatment plans to mitigate symptoms at home rather than through repeated clinic or ED visits. As one parent said, “I think the worker is like the bridge that gaps everything together between you and the doctor.” CHWs at PCC completed training in evidence-based pathways to cancer care allowing them to reinforce physician guidance and provide recommendations during acute events. Participants, caregivers, and program staff reported that as a result, participants and caregivers improved assessment of post-chemotherapy symptoms and visited the ED only when needed.

Though they never used the term “social determinants of health,” participants in all programs reported that CHWs assisted them with issues such as food insecurity, poor housing,

transportation, or health education, all areas that clinical team members often did not have time to address. For example, ECHO CHWs helped their state's highest risk Medicaid beneficiaries to find employment and safe housing. ABC, CHAMP, and OHOCAD CHWs improved health literacy regarding disease management. CHAMP CHWs assisted with obtaining transportation to appointments. Because CHWs generally hailed from the same communities and backgrounds as participants, participants were reportedly more willing to reveal needs without fear of judgment or unwanted social service involvement. One CHW said, "It's more intimate. Build a relationship and a bond and trust with these people in their home." Caregivers, participants and program staff agreed that meeting social needs allowed individuals and families to better manage medical care, follow treatment plans, communicate with providers, and prevent exacerbations.

Caregivers reported that CHWs lowered stress levels. While the impact of stress reduction was not directly measurable, caregivers' improved well-being offers potential for productive service use and spending. Caregivers from ABC, CHAMP, OHOCAD, and PCC in particular noted that the CHWs took "guess work" out of managing loved ones' care. Caregivers at PCC reported that prior to program enrollment, the need to memorize guidance given during physician visits meant little time to ask questions, resulting in substantial stress. Caregivers reported that having a CHW with them at appointments allowed them to support their loved one rather than recording details, which the CHW could explain later. As one participant noted, "We would be lost without [our CHW]." ABC caregivers received guidance on timing nursing home entry, especially helpful when their own health was suffering under caregiving burdens. One caregiver reported, "[Our CHW] made me realize that it's about me as well ... things I need to do for me in order to be a good caregiver." During focus groups, many participants from all programs reported they considered their CHWs to be family.

## DISCUSSION

Our mixed methods analyses indicate that five out of six programs in our sample with robust CHW involvement achieved reductions in at least one measure of utilization or cost (the sixth program showed no reductions or increases). Participants reported improved health and more efficient and appropriate use of the medical system across all programs, supporting quantitative findings on cost and utilization.

Regardless of age, gender, race-ethnicity, medical condition, or geographic location, participants near-universally valued their interactions with CHWs. They noted that CHWs not only facilitated access to care that improved their health, but also helped them become more activated and involved in self-care. While clinicians can generally provide services only for a patient, CHWs can engage the family members and caregivers who surround that patient, activating them and essentially expanding a care team further through supporting and involving the people who most frequently facilitate an individual patient's care.

All six programs showed qualitative improvements in care that were directly attributable to participants' experiences with CHWs, and all but ABC achieved significant, measurable reductions in cost and utilization. The one program that did not show reductions, ABC, emphasized referrals for unmet medical needs, likely contributing to increases in utilization that were necessary to appropriately maintain or improve their participants' health. It is particularly notable that though all patients were considered vulnerable by means of economic disadvantage, we found significant cost reductions across programs serving diverse populations—children or adults; rural or urban residents; those with a single condition or those with multiple chronic illnesses; and participants

who were white, black or Hispanic.

Despite mounting evidence supporting CHWs' role in increasing quality of and access to care, promoting appropriate utilization, and reducing costs for diverse participants with a range of conditions, substantial barriers remain to successful implementation of CHW programs. Barriers to successful implementation and sustainability of CHW-based interventions include acceptance of CHWs by clinical teams; program ability to access, hire, and retain the available workforce; and insurance reimbursement policies. Current payment policies particularly impede employment of non-clinical staff such as CHWs, as many insurance programs do not reimburse for services provided by care team members without clinical credentials. State Medicaid programs generally have the capacity to obtain waivers to allow reimbursement, offering a natural path for pursuing program sustainability if programs obtain bridge funding (Colligan, Tomoyasu, & Howell, 2014).<sup>2</sup> However, there is no current mechanism to receive any reimbursement for CHW services under Medicare. Alternative payment models and payment reform could offer a home for CHWs through offering reimbursement for care coordination provided by non-clinicians or reimbursement through bundled payments, which support team-based care and allow program flexibility to hire non-clinical staff.

Successful implementation of CHW programs involves finding CHWs who have community connections and the ability to build and sustain personal relationships. Clinical care team integration was a crucial component of CHW program effectiveness, but such integration requires buy-in from physicians and institutional administrators (Skillman, 2017), which may need to occur long before service initiation. For CHW interactions to facilitate appropriate care access and avert avoidable medical use, programs need thoughtful planning and implementation. The findings presented in this paper add to the mounting evidence of CHWs' effectiveness in improving health and quality of care across a variety of conditions while also increasing appropriate use of medical resources, especially when the CHWs are serving low income and vulnerable program participants. Leveraging mentorship from established CHW programs may minimize implementation challenges for programs that wish to initiate use of CHWs. CHWs potentially have spillover effects on caregiver health and costs, an area worthy of further investigation. Additional efforts in disseminating evidence related to CHW's cost effectiveness may encourage payment reforms that will promote universal integrating of CHWs into care teams and furthering goals of reducing health disparities for diverse vulnerable populations across the United States.

This study has several limitations. Medicare and Medicaid analysis is limited to available and reliable covariates in claims data. For example, many measures of disease severity and functional status are unavailable or unreliable in claims (Community Health Worker National Workforce Study, 2007) and thus not included in our models. We include measures of multimorbidity, using HCC or CDPS, and mirror disease severity and clinical risk using claims-based events (e.g., hospitalization before enrollment) as possible. While we include demographic, clinical, and utilization characteristics in our matching strategy, unobserved variance between treatment and comparison patients may exist. Findings are limited to patients who are Medicare fee-for-service or Medicaid beneficiaries with available claims. Each program serves heterogeneous participants with varying diagnoses and condition acuity, so analytic sample sizes

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<sup>2</sup> Other changes to simplify, modernize, and clarify Medicaid benchmark requirements and coverage requirements, 78 Federal Register 135 (15 July 2013), pp. 42226–7.



may not fully represent all program participants' experiences. Finally, though patient and caregiver focus groups included a breadth of participants, recruitment through convenience sampling may not have saturated the complete range of participant experiences.

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