

Observational Analysis of a Generalized, Health Plan-led Community Health Worker Intervention in Medicaid

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Aliza S. Gordon^{1*} , Allison H. Oakes^{2**,**}, Rebeca Allender¹, Lucida Vang¹, Beau Hennemann¹, and Winnie C. Chi¹

Abstract

Introduction/Objectives: In 2018, a Medicaid managed care plan launched a new community health worker (CHW) initiative in several counties within a state, designed to improve the health and quality of life of members who could benefit from additional services. The CHW program involved telephonic and face-to-face visits from CHWs who provided support, empowerment, and education to members, while identifying and addressing health and social issues. The primary objective of this study was to evaluate the impact of a generalized (not disease-specific), health plan-led CHW program on overall healthcare use and spending.

Methods: This retrospective cohort study used data from adult members who received the CHW intervention (N=538 participants) compared to those who were identified for participation but were unable to be reached (N=435 nonparticipants). Outcomes measures included healthcare utilization, including scheduled and emergency inpatient admissions, emergency department (ED) visits, and outpatient visits; and healthcare spending. The follow-up period for all outcome measures was 6 months. Using generalized linear models, 6-month change scores were regressed on baseline characteristics to adjust for between-group differences (eg, age, sex, comorbidities) and an indicator for group.

Results: Program participants experienced a greater increase in outpatient evaluation and management visits (0.09 per member per month [PMPM]) than the comparison group during the first 6 months of the program. This greater increase was observed across in-person (0.07 PMPM), telehealth (0.03 PMPM), and primary care (0.06 PMPM) visits. There was no observed difference in inpatient admissions, ED utilization or allowed medical spending and pharmacy spending.

Conclusions: A health plan-led CHW program successfully increased multiple forms of outpatient utilization in a historically disadvantaged population of patients. Health plans may be particularly well positioned to finance, sustain, and scale programs that address social drivers of health.

Keywords

community health worker, Medicaid managed care, program evaluation, healthcare utilization

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Introduction

Throughout the healthcare system, efforts are underway to improve healthcare quality and health outcomes, while reducing costs. The movement toward value-based care creates accountability for long-term population health improvement, thus directly incentivizing interventions that target the social drivers of health (SDoH).^{1,2} Aware of this, traditional healthcare entities (eg, health plans, hospitals, health systems) are looking to go beyond the provision of typical medical care and are shifting their work to include the underlying social, economic, and behavioral drivers of health.^{3,4} Questions remain regarding best practices for implementation, impact, and ability to scale programs that address the SDoH.⁵

One strategy that can accomplish the goals of a value-based health system is the integration of community health workers (CHWs). CHWs are trusted laypeople who work or

¹Elevance Health Inc, Indianapolis, IN, USA

²Trilliant Health, Brentwood, TN, USA

*Co-first authors.

**Dr. Oakes was employed by Elevance Health at the time the research was conducted.

Corresponding Author:

Aliza S. Gordon, Director of Research, Public Policy Institute, Elevance Health Inc, 120 Monument Circle, Indianapolis, IN 46204, USA.

Email: Aliza.gordon@elevancehealth.com



volunteer to help improve the health of members in their community. CHWs provide services such as culturally appropriate health education, referral to community resources, interpretation and translation, informal counseling, and patient advocacy.⁶ Existing literature suggests that CHW programs can improve chronic disease outcomes. Historically, these programs and their associated evaluations have focused on specific patient populations and narrow clinical outcomes, such as HbA1c levels for diabetes patients,⁷ preterm birth and low birth weight,⁸ viral load and CD4 counts for HIV patients,⁹ and weight, blood pressure, and lipids.^{10,11} Less is known about the impact of CHW programs on general (not specific to a particular condition) healthcare utilization and spending. An emerging area of research, a health system-led randomized controlled trial of a CHW intervention for 330 individuals with chronic conditions demonstrated a significant reduction in inpatient admissions resulting in a 2.47:1.00 return on investment of Medicaid dollars.¹² Similarly, a VA-based CHW intervention for patients with multiple chronic conditions led to an overall decrease in hospitalizations.¹³

Despite their record of success, sustainable funding remains a significant barrier to expanding the work of CHWs and increasing their integration into the healthcare system. To date, most programs have been implemented by a single hospital or community-based organization; this model makes it difficult to finance, sustain, and scale these programs. Instead, health plans may be particularly well positioned to operationalize and deploy CHW interventions.^{14,15} First, health plans have the resources and geographic reach needed to test and scale effective programs. Second, the financial incentives are well aligned—while programs focused on the social drivers of health have significant upfront costs, aside from the program recipients, health plans stand the most to gain from their success. Practically, Medicaid managed care plans provide an ideal setting in which to test programs that address the social drivers of health. Utilizing a per member per month (PMPM) (capitated) payment model, these public-private partnerships administer benefits to more than two-thirds of Medicaid enrollees, a population with significant unmet need.¹⁶

In 2018, a Medicaid managed care plan in a large, western state launched a new CHW initiative designed to improve the health and quality of life of Medicaid members who could benefit from additional support services. The primary objective of this study is to evaluate the impact of this program on overall healthcare utilization and spending.

Methods

Program Description

In 2018, a large Medicaid managed care plan launched a new CHW initiative (“CHW program”). Eligible members

included those with chronic conditions (eg, diabetes, high blood pressure, coronary heart disease, chronic obstructive pulmonary disease), recent hospitalization, multiple emergency department (ED) visits, or homelessness. Generally, the CHW program involved telephonic and at-home face-to-face visits from CHWs who provide support, empowerment, and education to members, while identifying and addressing social and health issues. In particular, CHWs supported members and their families by: assessing needs, such as food insecurity, housing, living environment, activities of daily living, medications, gaps in care, etc.; referring to special programs, community resources, prevention/wellness resources, and support groups; providing care coordination such as help with primary care provider (PCP) assignment, transportation, and navigation of health plan benefits; accompanying members to doctor’s appointments, as needed; participating in care conferences with providers related to the member’s care plan, as needed; offering interpretation and translation services; and providing culturally appropriate education to patients and ensuring cultural competence among providers. The CHWs who were providing these services were formally employed by the health plan. Due to the COVID-19 pandemic, the CHW program transitioned to telephonic-only on March 6, 2020. The CHW program returned to the field in September 2021, however it involved relatively limited face to face interaction. Given the timing of our study (see below), the initial outreach for all members of the study sample involved up to 2 telephone calls to schedule a face-to-face assessment, and if the member was not reached after 2 telephone calls, the CHW went to the member’s home to attempt to engage. If unable to reach the member through calls or the home visit, the CHW left business cards, a flyer, and letter at the doorstep.

Data Sources and Study Design

This retrospective cohort study used data from Medicaid insured members who received the CHW intervention (participants) compared to those who were identified for participation but were unable to be reached (nonparticipants). The eligible member sample was identified using administrative program data that was maintained by the CHW program. All study measures were generated using Medicaid enrollment data and medical and pharmacy claims. The claims-based dataset was derived from the HealthCore Integrated Research Database (HIRD), a large administrative claims database containing medical and pharmacy claims for 19 of Anthem’s affiliated Medicaid health plans across the United States. This study included medical and pharmacy claims from May 2016 through December 2020. Researchers had access to a limited dataset; strict measures were observed to preserve member anonymity and

confidentiality to ensure full compliance with the Health Insurance Portability and Accountability Act. This study was nonexperimental and was exempt from institutional review board approval as it was an analysis of the managed care organization's membership data for the purposes of health plan treatment, planning, and operations.

For program participants, the index date was defined as the first date in which the member partook in the CHW program (ie, a CHW made successful contact with the member and s/he did not decline participation). For the nonparticipant group, the index date was defined as the first date that a CHW unsuccessfully attempted to reach the member. Baseline member characteristics were determined using claims data from the 6 months prior to index date. Outcomes were assessed using claims data from the 6 months after the index date.

Study Sample

The study included adults at least 18 years of age who had Medicaid health plan enrollment for at least 6 months before and 6 months after the index date. Eligible members were also required to have been referred to the CHW program, with first contact made or attempted between May 1, 2018 and March 6, 2020 (ie, when outreach was transitioned to telephonic-only). Members who declined participation (less than 10% of the eligible members) were excluded from the analysis—the authors expect that this group differed from the participant group in more observable and unobservable characteristics (eg, lower motivation or conversely lower need) versus members who were eligible but unable to be reached.

Outcome Measures

This evaluation compared the medical and pharmacy utilization and costs of program participants to nonparticipants. Medical utilization included both scheduled and emergency inpatient admissions. Emergency admissions were defined as admissions via the emergency department or ambulance; scheduled admissions included all other inpatient admissions. Medical utilization also included total ED visits; ED visits by category of non-emergent, primary care treatable, avoidable, and non-preventable; outpatient evaluation and management (E&M) visits; and outpatient E&M visits by category of in-person, telehealth, and primary care. Telehealth visits were identified using CPT codes and CPT code modifiers. In-person visits were estimated by subtracting the number of telehealth visits from the total number of outpatient E&M visits. Primary care was identified separately using the relevant CMS specialty codes. Costs were operationalized as total allowed medical spending and total allowed pharmacy spending, which captures both plan-paid and patient-paid amounts. All utilization and cost metrics

were measured PMPM. The follow-up period for all outcome measures was 6 months from the index date.

Statistical Analysis

Change score models were used to explore the association of program participation with medical and pharmacy utilization. Using generalized linear models with a normal distribution, 6-month change scores were regressed on baseline characteristics and an indicator for group. Examining the indicator for group, positive values can be interpreted as a greater increase or smaller reduction in utilization or spending among participants compared to nonparticipants, whereas negative values refer to a greater reduction or smaller increase from baseline to follow-up in the participant group versus the nonparticipant group. All regression models included baseline age, sex, race/ethnicity, urban versus rural residence, and Elixhauser Comorbidity Index score. In addition, the authors included the proportion of follow-up time that occurred during the COVID pandemic (ie, after March 6, 2020) as a covariate, as exposure to the COVID pandemic significantly disrupted the provision of healthcare services and changed patterns of care-seeking behavior. The analysis did not adjust for prior utilization or costs because prior care seeking is related to future care seeking behavior and does not necessarily match with health status. Additionally, the change score accounts for utilization and costs in the baseline period. To prevent the influence of extreme cost outliers, cost data were win-sorized at the first and 99th percentile.

To assess treatment heterogeneity, regression models with an interaction term followed by a Wald test were used to examine the overall effect of race and ethnicity. When significant, the marginal effect of being treated within each race and ethnicity was tested. Self-reported race and ethnicity information from Medicaid enrollment data was categorized as non-Hispanic Black, Hispanic, non-Hispanic White, and other. Because of the local nature of CHW programs, the authors also examined heterogeneity in treatment across the 4 largest counties in the data. Due to the limited sample size within each county, the findings from this sub-analysis should be considered exploratory.

A *P*-value of .05 or less (2-sided) was considered statistically significant; for subgroup analyses with smaller samples, a *P*-value between .05 and .10 was considered marginally significant. Analyses were performed using the Stata software package, version 16, and SAS Enterprise Guide, version 7.1.

Sensitivity Analyses

Two sensitivity analyses were conducted. For the first, the effect of the CHW program up to 18 months post-index date was assessed to examine the possibility of a delayed (or

Table 1. Baseline Characteristics of Program-Eligible Medicaid Members (N=973).

Characteristic	Comparison (N=435)	Intervention (N=538)	P-value
Age, Mean (SD)	43.31 (15.14)	47.48 (14.35)	<.01
Female, No. (%)	263 (60.46%)	289 (53.72%)	.04
Race/Ethnicity, No. (%)			
White	104 (23.91%)	113 (21.00%)	.50
Black	70 (16.09%)	86 (15.99%)	
Hispanic	85 (19.54%)	104 (19.33%)	
Other/Unknown	167 (38.39%)	229 (42.57%)	
Missing	9 (2.07%)	6 (1.12%)	
Urban, No. (%)	435 (100%)	534 (99.26%)	.07
Elixhauser comorbidity index, Mean (SD)	4.37 (3.70)	5.44 (3.95)	<.01
Health conditions, No. (%)			
Diabetes	116 (26.67%)	190 (35.32%)	<.01
ASCVD	95 (21.84%)	173 (32.16%)	<.01
AMI/Stroke	35 (8.05%)	57 (10.59%)	.18
Hypertension	199 (45.75%)	316 (58.74%)	<.01
CHF	82 (18.85%)	127 (23.61%)	.07
Asthma	108 (24.83%)	110 (20.45%)	.10
COPD	69 (15.86%)	108 (20.07%)	.09
Cancer	22 (5.06%)	30 (5.58%)	.72
Smoking	185 (42.53%)	171 (31.78%)	<.01
Pregnancy—Delivery	7 (1.61%)	4 (0.74%)	.20
Proportion of COVID follow-up, Mean (SD)	0.05 (0.18)	0.09 (0.22)	.01

Abbreviations: AMI, acute myocardial infarction; ASCVD, atherosclerotic cardiovascular disease; CHF, congestive heart failure; COPD, chronic obstructive pulmonary disease; SD, standard deviation.

weakening) treatment effect. For this analysis, we used all available data from 18 months pre-index to 18 months post-index. Members had varying amounts of enrollment during this timeframe. All outcome measures were converted to PMPM for this analysis. For the second sensitivity analysis, we limited the participant group to members who were not reached by the CHW on their first contact. The rationale for this analysis is that this subset of individuals may be more similar to the comparison group, which is composed of individuals who were unable to be reached after 2 calls and a home a visit.

Results

Member Characteristics

Between May 1, 2018 and March 6, 2020, 1855 members were referred to the CHW program. Among members with the required health plan enrollment, 538 participated in the program and 435 were unable to be reached, forming the comparison group of nonparticipants (Table 1). The intervention group was slightly older (mean [SD] age, 47.5 [14.4] vs 43.3 [15.1] years), had a smaller proportion of female members (289 of 538 [54%] vs 263 of 435 [60%]), and had a higher mean (SD) Elixhauser Comorbidity Index score (5.44 [3.95] vs 4.37 [3.70]). There were no meaningful differences between the participant and nonparticipant

comparison group in race/ethnicity or the proportion of follow-up time that occurred after the COVID-19 pandemic began.

Overall Healthcare Utilization

In the baseline period, mean outpatient E&M use was 0.84 visits PMPM for CHW program participants and 0.59 visits PMPM for nonparticipants (Figure 1; Table 2). In the first 6 months of the CHW program, mean outpatient E&M use increased to 0.91 visits PMPM for CHW program participants and decreased to 0.51 visits PMPM for nonparticipants. There was a statistically significant greater increase in the 6-month change in outpatient E&M visits [0.15 PMPM; $P < .01$] in the CHW participant group versus the comparison group. This greater increase was statistically significant across in-person [0.12 PMPM; $P = .01$], telehealth [0.03 PMPM; $P < .01$], and primary care [0.06 PMPM; $P = .01$] visit types. There was no observed difference in inpatient admissions, ED utilization, or ED utilization by category of severity.

Overall Healthcare Spending

The CHW program was not associated with a reduction in overall spending. Total allowed medical spending decreased

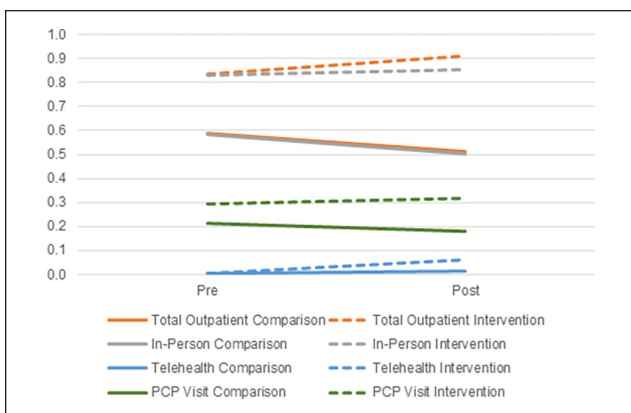


Figure 1. Unadjusted changes in outpatient utilization by group, per member per month. Per member per month unadjusted changes in outpatient utilization by group 6 months before and 6 months after CHW program exposure. In-person visits were estimated as total outpatient evaluation and management visits less telehealth visits; primary care visits could occur via in-person or telehealth. Abbreviations: PCP, primary care physician.

substantially from baseline to the intervention period in both the CHW participant and nonparticipant group, but there was no statistically significant association of the CHW program [−\$362 PMPM; $P=.33$] (Table 2). In both groups, total allowed medical spending peaked in the month immediately preceding the intervention, likely an artifact of program eligibility (Figure 2). Total allowed pharmacy spending increased from baseline to intervention in both groups; there was a nonsignificant differential change in total allowed pharmacy costs [\$35 PMPM; $P=.19$] relative to the comparison group (Table 2).

Subgroup and Sensitivity Analyses

The analysis did not detect differences in treatment effect by race and ethnicity for inpatient admissions, outpatient E&M visits, or overall healthcare spending. Race and ethnicity were associated with a differential pattern in overall ED use ($P=.03$), driven by variation in non-emergent ED visits ($P=.03$). Examining the marginal effect, White

Table 2. Unadjusted and Adjusted Differential Changes in Utilization and Spending in Community Health Worker Program Participants Versus Nonparticipants, 6 months Pre- and Post-Intervention.

	Pre-intervention		Post-intervention		Difference		P-value*
	Comparison (N=435)	Intervention (N=538)	Comparison (N=435)	Intervention (N=538)	Unadj diff between groups	Adj diff between groups	
Utilization, PMPM, Mean (SD)							
Inpatient admissions	0.23 (0.38)	0.27 (0.38)	0.17 (0.37)	0.18 (0.38)	−0.02	−0.01	.72
Emergency admissions	0.21 (0.34)	0.23 (0.35)	0.15 (0.32)	0.16 (0.36)	−0.01	0.01	.73
Emergency department visits	0.59 (0.69)	0.44 (0.64)	0.44 (0.60)	0.32 (0.53)	0.04	0.03	.43
Non-emergent	0.40 (0.55)	0.31 (0.51)	0.30 (0.46)	0.23 (0.40)	0.02	0.01	.61
Primary care treatable	0.25 (0.35)	0.21 (0.45)	0.21 (0.37)	0.17 (0.33)	0.01	0.00	.99
Avoidable	0.14 (0.34)	0.10 (0.26)	0.11 (0.26)	0.08 (0.23)	0.01	0.01	.41
Non-preventable	0.16 (0.25)	0.16 (0.37)	0.14 (0.25)	0.13 (0.30)	−0.01	−0.01	.54
Outpatient E&M visits	0.59 (0.78)	0.84 (0.83)	0.51 (0.70)	0.91 (0.93)	0.15	0.15	<.01
In-person	0.58 (0.78)	0.83 (0.83)	0.50 (0.69)	0.85 (0.89)	0.11	0.12	.01
Telehealth	0.00 (0.03)	0.01 (0.04)	0.01 (0.07)	0.06 (0.21)	0.04	0.03	<.01
PCP visit	0.21 (0.35)	0.29 (0.37)	0.18 (0.31)	0.32 (0.40)	0.06	0.06	.01
Costs, PMPM, Mean (SD)							
Total allowed medical	\$3,364 (\$5497)	\$5,064 (\$6885)	\$2,403 (\$4707)	\$3,369 (\$5769)	−\$734	−\$362	.33
Total allowed pharmacy	\$182 (\$345)	\$370 (\$617)	\$173 (\$361)	\$398 (\$686)	\$36	\$35	.19

Abbreviations: Adj, adjusted; E&M, evaluation and management; PCP, primary care physician; PMPM, per member per month; SD, standard deviation; Unadj, unadjusted.

*P-value associated with the adjusted difference between groups.

Bolded values show statistically significant adjusted differences and their associated P-values.

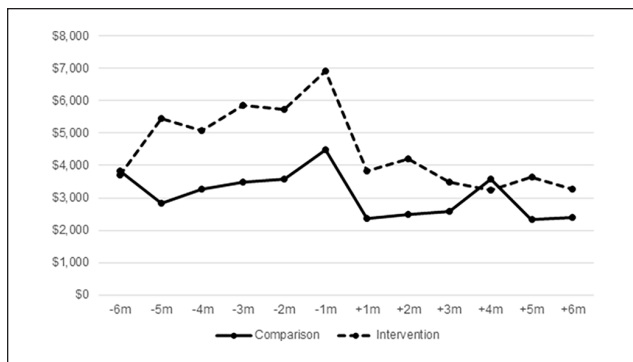


Figure 2. Unadjusted average monthly total medical spending by group, per member per month.

participants experienced a significant increase in overall ED visits [0.18 PMPM; $P=.01$]. Within the category of non-emergent ED visits, Black participants experienced a marginally significant reduction [-0.13 PMPM; $P=.07$] (Supplemental Appendix Table 1).

In our county-level sub-analysis, increases in outpatient E&M visits (both overall and by subcategory) were observed in 3 of the 4 counties. In one county, the CHW program was not associated with an increase in outpatient E&M visits, however there was a significant reduction in inpatient admissions [-0.12 PMPM; $P=.04$] (data not shown). Anecdotally, staff from the CHW program feel the latter finding is due to a very close relationship with one of the major local hospitals.

In the sensitivity analysis using all available data for 18 months pre- and post-index, there were no meaningful differences between the participant and nonparticipant comparison group in total observed eligible baseline (mean [SD] days, 507 [93] vs 508 [90] days) or follow-up days (mean [SD] days, 480 [97] vs 492 [99] days). Including all available data up to 18 months pre- and post-index date, program participants maintained a greater increase in telehealth [0.05 PMPM; $P<.01$] and primary care [0.05 PMPM; $P=.01$] use (Supplemental Appendix Table 2). All other outcomes were nonsignificant, including overall outpatient E&M visits and in-person outpatient visits.

Two hundred seventy-seven (51.5%) participants were not reached during the first attempted contact by a CHW and were included in the second sensitivity analysis. Similar to the full participant cohort, this subset of participants was older and had more comorbidities than the comparison group (Supplemental Appendix Table 3). The changes in healthcare utilization and cost in the participants compared to nonparticipants closely mirrored the original analysis, with increases in all types of outpatient E&M visits among the participant group, and no other significant differences between groups (Supplemental Appendix Table 4).

Discussion

In this work, the authors evaluate the association between participation in a health-plan led CHW program and general healthcare use and spending. In a high-risk population of relatively disadvantaged individuals, the program was associated with increased outpatient use via in-person, telehealth, and primary care visits. Increased telehealth and primary care use persisted 18 months post-intervention. There was no association between program participation and inpatient admissions, ED use, or medical or pharmacy spending.

Consistent with the existing literature, the observed increase in outpatient care provides evidence to support the role of CHWs as trusted mediators between historically hard-to-reach members, their health plan, and their care providers.⁶⁻¹³ This increase was observed across multiple subcategories of outpatient care including in-person, telehealth, and primary care visits. Importantly, there was nearly a 6-fold increase in telehealth in the intervention group relative to the comparison group. While the COVID-19 pandemic led to the rapid expansion and uptake of telehealth, emerging evidence suggests that increased “digital” access could have exacerbated existing health disparities.^{17,18} The observed increase in the intervention group suggests that the CHW program was particularly effective at increasing uptake of telehealth within this population. The sustained increase in primary care over an 18-month period is also noteworthy. Able to provide a usual source of care, early detection and treatment of disease, chronic disease management, and preventive care, access to primary care is associated with positive health outcomes.¹⁹⁻²¹ The observed increase in outpatient care did not lead to a subsequent increase in total medical or pharmacy spending, potentially speaking to the cost-effective nature of these services.

There are several possible explanations for why there was no observed relationship between the CHW program and inpatient use, ED use, or spending. The CHWs work with their patients to address the root causes of their health conditions, including trauma and housing instability. Many of these changes take time to yield results. Even though the authors conduct a sensitivity analysis using up to 18 months of post-intervention data, it is possible that these changes might take more time to make a meaningful difference. In addition, there is not long-term follow up data (greater than 6 months) for all members. It is possible that 18-month dropout is concentrated among members who have improved and/or transitioned out of Medicaid. Alternatively, the program may not have been intense enough to achieve these endpoints. As a point of reference, the Philadelphia-based CHW program that reduced hospitalizations and had a positive return on investment was a 6month, high intensity program that entailed weekly points of contact.¹²

Anecdotally, it does not seem like the studied CHW program was as involved, however the authors lack the formal data needed to examine this.

This study is not without limitations. First, individuals were not randomized to participate in the CHW program, and those volunteering to participate may differ from those who could not be reached. To minimize this concern, the analysis included a comprehensive list of member-level characteristics as covariates in our regression models and a change score design was used. Second, the COVID-19 pandemic likely led to changes in patterns of care unrelated to the CHW program, although the comparison group and change score method help to minimize this bias. In addition, the proportion of participant follow-up time that occurred during the COVID-19 pandemic was included as a covariate and did not meaningfully differ between groups. This said, the results of this study may not be entirely generalizable to unaffected time periods. Third, the authors did not have detailed participation data, such as the number of times that an individual met with a CHW and the specific types of services provided, which may have allowed for a more precise assessment of program intensity. Relatedly, due to the nature of the claims data, clinical health outcomes were not assessed. While some quality measures such as HEDIS metrics can be assessed in claims, our sample was underpowered to study specific condition-based HEDIS metrics since the program was generalized and covered individuals with a variety of conditions. Finally, adjustment for multiple testing was not performed, though most meaningful findings were $P \leq .01$.

Conclusions

A health plan-led CHW program successfully increased multiple forms of outpatient utilization in a historically disadvantaged population. Program benefits were seen over a relatively short time horizon and the outpatient treatment effects persisted for 18 months. Generally, this program demonstrates that health plans can design and implement CHW programs to address social determinants of health and meaningfully impact healthcare utilization. Moreover, the broad nature of this program has practical implications for health plan and health system leaders who are interested in moving from disease-specific interventions to population health interventions that target multiple conditions. However, before scaling this program more broadly additional work is needed to determine if and how it can change patterns of ED use and spending. Whether experimenting or scaling, health plans and Medicaid MCOs are well positioned to lead these efforts because of their widespread geographic presence, well-aligned incentives, and obligation to their members.

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ORCID iD

Aliza S. Gordon  <https://orcid.org/0000-0003-4565-0771>

Supplemental Material

Supplemental material for this article is available online.

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