



COST ANALYSIS OF KC CARE COMMUNITY HEALTH WORKER PROGRAM

Using National Estimates of Avoided Care

A Report Prepared for the Health Care Foundation of Greater Kansas City

Abstract

Community health worker programs take many forms and have been shown to be effective in improving health in several contexts. The extent to which they reduce unnecessary care is not firmly established. This report uses cost information for a hub-and-spoke community health worker program run by KC Care (Kansas City, MO) to estimate the number of ED visits and hospitalizations that would need to be avoided for the program to recoup costs on a program level. This report does not take other outcomes of the program from the clients' or workers' perspectives into account so it is likely an upper bound on the number of avoided visits.

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Introduction

Community health worker (CHW) programs have the potential to improve patient wellbeing and reduce healthcare costs by facilitating the use of community resources and addressing social determinants of health. The long-term sustainability of CHW programs is linked to the degree to which program costs are offset by program benefits. There is a general sense from the literature that CHW programs are cost effective, but it is unclear how broadly these results can be applied^{1,2}. A broad analysis of CHW programs would be complicated by their many different potential configurations. Programs can differ according to the targeted patient population, the scope of services included, size, organizational structure, and the degree to which groups that benefit from the CHW services are linked to groups that bear the cost of the program.

Many programs focus on a specific disease within a specific racial/ethnic group; interventions are heavily focused on medical services; and outcomes are often measured using clinical data. However, the potential of CHW programs goes beyond medical services to an array of community-based resources that serve as a safety net or support independent living. We consider a broad program with few restrictions on the target patient population or type of community resources, and a centralized administration with varied funding sources. We first estimate the cost of providing services in this configuration and the corresponding number of emergency department (ED) visits and hospitalizations that would need to be avoided to make the program self-funding from a healthcare cost perspective using results from several published studies. We then consider the program cost implications of operating the same program with different facilities and administration costs.

Program cost relative to ED visits and hospitalizations serves as a useful reference point for decision makers and comparisons to the previous literature. However, medical service costs might not

capture the full benefit of a program that facilitates the use of other community services such as food, housing, and employment assistance.

Background

CHWs have begun to gain recognition as integral members of the health care workforce ^{3,4}. They provide needed assistance to patients in accessing primary care or preventive services, especially in underserved or vulnerable populations ⁵. Approximately 48,130 individuals were employed nationwide in 2015 ⁶ and many others work as volunteers. To date, most CHW research has focused on programs targeted on narrow populations (e.g., Latino participants) and identified health needs. The most commonly targeted health needs are diabetes ⁷⁻¹⁷, cardiovascular disease ^{7,18,19}, obesity ¹⁴, chronic disease management ²⁰, and cancer screening ²¹⁻²³.

Despite the narrowly targeted existing programs, the concept of CHWs and their potential to improve health outcomes is much broader. The American Public Health Association describes CHWs as trusted front-line public health workers with a very close understanding of the community²⁴. In this capacity, CHWs are well positioned to link participants with social and community services in addition to healthcare²⁴. Potential CHW activities extend beyond discussions of health services and health conditions to include social support, advocacy, assistance with forms and applications, and serving as an intermediary to a wide array of community services including housing, food, and disability supports ²⁵.

We consider a program that broadly serves vulnerable populations of low-income and uninsured/underinsured adults in a major metropolitan area ²⁶. CHW services provided by KC Care are not targeted toward a particular disease, racial or ethnic identification, or environmental risk factor ^{12,23,27,28}. Potential CHW program participants are identified or referred in four major ways: (1) people receiving emergency department care who report not having a usual source of care or other pressing healthcare need; (2) safety net service providers or community organizations (e.g., social workers); (3)

physicians or nurses practicing at the safety net clinic administering the program; and (4) people utilizing a service at a local county health department. Individuals may also self-refer although the percentage is relatively small. Referrals are based on needs for medical services as well as income, adult education, housing, transportation, and food¹. People who formally enroll in the program will work with CHWs for an initial period of 60 days and can be re-enrolled in the program for successive 60 day periods. These long term, individualized interactions allow CHWs to develop peer-to-peer relationships of trust and mitigate issues not easily addressed in short periods of time ²⁶.

We build upon the current literature by providing cost reference points for a broad-based program addressing a wide array of health and social service needs. Our analysis also includes a comprehensive set of equipment, facilities, and administrative costs to more fully capture total program costs. To provide context to our findings and make the comparison to other programs easier, we describe the program structure in the next section.

Program Information

We study a growing Community Health Worker Program established in 2009, which assists patients with multiple barriers to care in navigating the health care system and in accessing community-based services. A safety net clinic with more than 45 years of experience serving vulnerable populations in the Kansas City metro area operates the CHW program. Partnerships with regional foundations and providers are the underpinnings of the program. Since 2009, the clinic has grown the Community Health Worker Program from two CHWs to 24 CHWs and four supervisors. Community Health Workers operate in the Emergency Departments (EDs) of five local hospitals, two internal clinic locations, and a county health department. The program also has formal agreements with over twenty other safety net clinics, domestic violence shelters, and family and social service agencies.

¹ See appendix for a summary of needs assessment categories.

The CHW program recently upgraded to a comprehensive case management software platform that allows for standardized processes and data collection across program locations and CHWs. The workflow includes an initial needs assessment and collection of basic socio-demographic information. CHWs use a structured assessment tool to identify participant needs including the need to establish a primary care provider, access transportation, take and afford medication, access dental services, among others (e.g., food, housing, income, and employment). CHWs are not trained to address severe mental health or substance abuse issues; they refer potential participants with these needs to other safety net providers.

Potential participants are asked to sign an agreement to participate

^b and begin working with the CHW to develop 1-3 individualized goals to improve their health and overall quality of life. Medical needs are often paramount--CHWs often assist with scheduling medical appointments and sometimes attend these appointments to help patients learn how to successfully navigate the healthcare system and to help the patient understand information communicated in the appointment. CHWs might also gather paperwork for enrolling in other community-based services and assist the participant in completing and submitting the paperwork. As participants complete goals, they are re-enrolled for successive 60 day periods until all goals are met or they decline to continue in the program (some decline explicitly while others move out of the coverage area).

Overall, the program considered in this analysis has a broader patient population, more work locations, and greater integration of community services than programs previously evaluated in the peer-reviewed literature. More specifically, participants are not selected by diagnosis, racial or ethnic identification, or environmental risk factors. The KC Care CHW program targets largely uninsured or

^b This agreement was developed over time as a way to ensure enrolled participants were motivated to work toward their goals.

underinsured individuals who face significant barriers to accessing health or community services in the Kansas City metro area. Participants are identified through multiple sources including healthcare settings (clinics, emergency departments, county health department) and via referrals by professionals including social workers and nurses. CHWs meet and work with participants at locations throughout the community including participant homes, healthcare provider offices, and community offices for social services. The program is also one of the few that addresses social determinants of health simultaneously with medical needs. Participants need not set narrow health access or outcome goals, but might instead identify areas such as food or housing insecurity as higher priorities.

As noted above, the program uses advanced customized case management software (separate from provider EHR systems) to store participant information, generate goals and reminders, and identify and connect key members of the care team. This substantial investment in technology was made to improve program effectiveness, standardize processes and data collection, and to support future research activities including the ability to randomize participants across treatment and control protocols.

Data

Data on program costs are taken from administrative program records and include a more comprehensive set of administrative costs than used in previous studies (e.g., fringe benefits, professional insurance, higher-level supervisors, overhead costs).^c We drew estimates of ED visit and hospitalization costs (or charges in some cases) from the literature²⁹⁻³¹. We adjusted for Inflation using the Current Price Index Research Series Using Current Methods (CPI-U-RS).^d

^c Administrative cost allocation made by the clinic to establish a minimum or break-even CHW cost used to price additional CHW positions.

^d <https://www.bls.gov/cpi/cpiurs.htm>

Methods

We first establish baseline program costs based on the current program structure and then estimate the number of ED visits or hospitalizations would need to be avoided to recoup program costs based on national average healthcare estimates for different patient populations. Next, we adjust program costs for alternative administrative structures and estimate the implications for the number of ED visits and hospitalizations. The existing program is operated through a safety net clinic with relatively low facilities and administrative (F&A) costs. We consider the implications of operating the program through an entity with moderate or relatively high F&A rates.

Results

Baseline Costs

We estimate program costs in six different categories: personnel, training, transportation, equipment, facilities, and administrative costs. We calculate the all-inclusive cost of the CHW program to be \$1,646,904 or an average of \$68,621 per CHW.

Personnel costs include CHW salaries for entry-level (17) and more experienced CHWs (7), four managers (6 CHWs per manager), and a program director.^e Fringe benefits at 25% of salary costs and annual professional insurance premiums of \$555 per CHW are also included. Employees that provide administrative support (e.g., front desk staff), but do not represent direct program expenses, are included in the administrative costs category below. As indicated in Table 1, personnel costs account for the majority of total program costs (78%).

The centralized structure of this CHW program allows most training to be conducted internally as most managers and the program director have worked as CHWs. We include minimal **external training** costs of \$60 per CHW per year.

^e Salaries are \$31,300 for entry-level, \$32,940 for 2-3 years of experience, \$47,476 for managers, and \$67,000 for a program director.

Annual **transportation** costs for CHWs include travel to meet with clients at locations such as participant homes, medical providers, and social service offices. Transportation costs also include \$250 per CHW to account for transportation vouchers (e.g., bus passes) provided to participants. Transportation costs are \$2,050 per CHW and represent about 3% of total program costs.

The **equipment** category includes technology costs for tablet computers, annual subscription costs for the case management software, contracted IT support, and basic office supplies. We expect CHW tablet computers to receive heavy use in the field and have allowed for biennial replacement. Equipment costs are estimated to be \$5,338 per CHW and represent almost 8% of total program costs.

The **facilities and administrative** (F&A) categories capture costs for office space and furniture, utilities, and administrative support. These two categories combined equal 11% of the direct program costs included in the previous four categories. This calculation is consistent with the clinic’s organization-wide 11% F&A rate for contracts and grants.

Table 1. Baseline CHW Program Costs by Category (rounded 2016 dollars)

Category	Total Costs	Mean Cost (per CHW)	Percent
Personnel	\$1,285,671	\$53,570	78.1%
Training	\$1,440	\$60	0.1%
Transportation	\$49,200	\$2,050	3.0%
Equipment	\$127,874	\$5,328	7.8%
Facilities	\$70,752	\$2,948	4.3%
Administrative	\$111,967	\$4,665	6.8%
Total Yearly Costs	\$1,646,904	\$68,621	100.0%

Breaking Even by Avoiding ED Visits and Hospitalizations

In this section, we estimate the number of ED visits or hospitalizations needed to offset the program cost for one CHW. The program draws from primarily low-income adults in the Kansas City metro area. Because area and population specific estimates do not exist, we consider several possible measures of ED and hospitalization costs in Table 2. We include estimates from previous studies

converted to 2016 dollars for analysis. We also include estimates of both charges and costs. Cost estimates are more relevant for organizations providing the ED and hospitalization services (e.g., when the hospital system is funding the CHW) whereas the cost of services to a third party payer (e.g., insurer) likely lies between the cost and charge estimates.

The first row of Table 2 indicates a national median ED charge of \$1,233 or \$1,375 in 2016 dollars. To fully offset program costs, each CHW would need to work with their annual caseload of 150 participants to avoid almost 50 ED visits collectively. If CHW participants also avoided two hospitalizations, the number of avoided ED visits needed to offset costs would reduce to just over 34.

Based on an annual caseload of 150 participants per CHW, reductions in ED visits of 22%-33% of caseload are consistent with the literature¹. However, the number of visits that need to be avoided is likely an upper bound for two reasons. First, while medians are often used to estimate expected expenditures in highly skewed distributions, we would expect the CHW program also to prevent some higher cost ED visits making a mean cost more appropriate for estimating costs savings. Results for a mean ED visit charge of \$2,417 indicate that costs are offset after 28 ED visits or two hospitalizations and 20 ED visits are avoided per CHW.

Second, the estimates from Caldwell et al.³⁰ represent a national average across all patients and it is possible that the uninsured and underinsured population served by the clinic has different mean costs. In rows 3 and 4 of Table 2, we present actual cost numbers and charges calculated for patients of a safety net clinic. Using charges instead of provider costs, each CHW would need participants to avoid 14 ED visits or 2 hospitalizations and almost 10 ED visits in one year. To offset provider costs, each CHW would need their panel of 150 participants to avoid 36 ED visits or two hospitalizations and 25 ED visits.

Results for hospitalizations are also presented in Table 2. Hospitalization costs are estimated provider costs for each service (prices for third party payers likely to be higher). We consider the national average hospitalization cost, the cost for older adults (45-64), and mean costs for uninsured

patients. Focusing on costs for uninsured patients because they are likely to be the most similar to the CHW program participants, we find that program costs would be offset if participants avoided 8 hospitalizations per CHW or 10 ED visits and 6 hospitalizations.

Table 3 includes similar estimates for ED visits and hospitalizations where we allow for more moderate F&A costs (25%) and an F&A rate approximating those charged by institutions of higher education (55%). Increasing the F&A rate from 11% to 25% increases the number of ED visits and hospitalizations needed by about 10-11%. The number of cost offsetting ED visits and hospitalizations were 27% higher with the 55% F&A rate.

Table 2. ED visits and Hospitalizations Needed to Offset the Cost of One CHW (2016 Dollars)

	Emergency Department (ED)				Hospitalizations		
	Charges			Costs	Costs ⁴		
	Median for all patients ²	Mean for all patients ²	Mean for safety net patients ³	Mean for safety-net patients ³	Mean for all patients	Mean for patients aged 45-64	Mean for uninsured patients
Estimated Amounts from Academic Literature ¹	\$1375	\$2417	\$4986	\$1908	\$10678	\$13320	\$8917
Number of Avoided visits to break even ⁵	50	28	14	36	6	5	8
Number of Avoided ED visits to break even if 2 Hospitalizations also avoided	34	20	9	25	n.a.	n.a.	n.a.
Number of Avoided Hospitalizations to break even if 10 ED visits also avoided	n.a.	n.a.	n.a.	n.a.	5	4	6

1. Amounts from cited papers were converted to 2016 dollars by the authors and rounded to the nearest dollar. 2. PLOS, 3. HSR, 4. H-CUP, 5. Entries rounded to the nearest whole number.

Table 3. ED visits and Hospitalizations Needed to Offset the Cost of One CHW Using Alternative Facilities & Administration Rates

	Emergency Department (ED)				Hospitalizations		
	Charges			Costs	Costs ⁴		
	Median for all patients ²	Mean for all patients ²	Mean for safety net patients ³	Mean for safety-net patients ³	Mean for all patients	Mean for patients aged 45-64	Mean for uninsured patients
Facilities and Administration Rate of 25%							
Number of Avoided visits to break even ¹	56	32	15	40	7	6	9
Number of Avoided ED visits to break even if 2 Hospitalizations also avoided	40	23	11	29	n.a	n.a	n.a
Number of Avoided Hospitalizations to break even if 10 ED visits also avoided	n.a	n.a	n.a	n.a	5	4	6
Facilities and Administration Rate of 55%							
Number of Avoided Visits to break even	69	39	19	50	9	7	11
Number of Avoided ED visits to break even if 2 Hospitalizations also avoided	53	30	15	38	n.a	n.a	n.a
Number of Avoided Hospitalizations to break even if 10 ED visits also avoided	n.a	n.a.	n.a.	n.a.	7	6	9

1. Entries rounded to the nearest whole number. 2. PLOS, 3. HSR, 4. H-CUP

Discussion

We estimate higher CHW program costs than recently published work, \$68,621 vs. \$47,800¹.

Several methodological and program differences account for this variation. This analysis contains a robust inclusion of facilities and administration costs. The program included in this study also has a high degree of internal training and oversight by incorporating both managers (1 per 6 CHWs) as in Basu et al.¹ and a program director in addition to personnel costs included in Basu et al.¹. The KC CARE CHW program also uses a robust software system for case management, which was either not utilized or not included in the costs in the previous study.

Estimates of the cost-offsetting number of ED visits or hospitalizations for CHW workers in the studied program are meaningfully impacted by whether costs are measured as actual provider costs or charges and whether the cost estimates are based on the target population. Choice of cost measure is likely to depend on whether the program is being funded by the entity providing the ED and hospitalization services or by other payers or community groups. Our estimates suggest that it is crucial to align cost estimates with the CHW program population. The target number of offsetting ED visits and hospitalizations varies greatly depending on whether actual provider costs or charges are used. The most appropriate measure is likely to differ depending on the perspective of the payer. Some funders, such as foundations or government entities, might be concerned with social costs and benefits whereas other funders, such as hospital systems might want to consider only the costs of providing services.

Additionally, estimates of the number of ED visits and hospitalizations needed to offset program costs are sensitive to facilities and administrative costs. Although these costs are often difficult to estimate, inclusion is vital to arrive at an accurate picture of offsetting program costs. Achieving cost-offsetting outcomes is much more likely for entities that keep F&A costs low.

These estimates are meant as a starting point for decision makers. Other CHW programs are likely to differ in structure and we have strived to provide enough program information for others to

assess how their costs are likely to differ. For example, other programs might operate from one fixed location and incur lower travel costs.

Limitations

A broad focus on participant needs and community services is a key strength of the program included in this study. However, our estimates only address a narrow portion of potential cost savings in the form of avoided ED visits and hospitalizations. Notable exclusions are benefits associated with patient quality of life, long term health and wellness benefits from accessing community services such as food and housing supports, and effects on other members of the participant's family/care team. The program might also improve employment prospects or help participants identify stable sources of income (e.g., disability benefits). We are limited to estimates of ED visit costs and hospitalization as actual payments are likely to vary by provider and represent proprietary information.

CHW programs have the potential to address both medical service needs and social determinants of health. To date, there is little focus in the literature on programs that address a broad array of participant needs, how these programs are structured, and how program costs relate to healthcare cost estimates used in the previous literature. This study provides reference points for a community based program with services that extend well beyond healthcare.

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