

Measuring Return on Investment of Outreach by Community Health Workers

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Abstract: Community health workers (CHWs) are effective in improving access to health care, promoting client knowledge and behavior change, and contributing to improved health status of individuals. However, few outreach programs have evaluated the financial impact of CHWs on health care systems and policies. A longitudinal repeated measures design was used to assess the return on investment (ROI) of outreach by CHWs employed by Denver Health Community Voices. Service utilization, charges and reimbursements for 590 underserved men were analyzed 9 months before and after interaction with a CHW. Primary and specialty care visits increased and urgent care, inpatient, and outpatient behavioral health care utilization decreased, resulting in a reduction of monthly uncompensated costs by \$14,244. Program costs were \$6,229 per month and the ROI was 2.28:1.00, a savings of \$95,941 annually. These data provide evidence of economic contributions that CHWs make to a public safety net system and inform policy making regarding program sustainability.

Key words: Community health worker, cost effectiveness, return on investment, outreach.

Community health workers (CHWs) deliver necessary health care services to underserved populations in many capacities, including providing culturally relevant health education, care management, system navigation, and enrollment in publicly funded health insurance. Community health workers, also known as *promotoras*, lay health workers, or community health advisors, are trusted members of their communities who provide community-based health services and vital links between health systems and communities.^{1,2}

Evaluation of CHW services and programs across the U.S. vary widely. Most commonly, data are collected to reflect process measures, such as the number of clients seen, applications taken, or referrals given.^{3,4} However, some CHW programs have outcomes data to demonstrate effectiveness of CHW interventions.^{4,5} In fact, the CHW literature provides support for CHWs improving access through the provision of health screening, patient navigation, and referrals to primary care providers,^{6,7,8} promoting client knowledge and behavior change (primarily through health education),^{9,10} and contributing to improved health status of patients with chronic diseases, such as diabetes and hypertension.¹¹

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Although CHWs are effective in these capacities, few community outreach programs have evaluated the financial impact of CHWs on health care systems and policies. Consequently, support for CHW programs nationwide is inconsistent.^{12,13} Health care safety net decision makers need evaluations of the financial impact of CHWs to establish value and make policy decisions about continued investment and sustainability.

The purpose of this study is to evaluate the financial effectiveness of CHW interventions with a population using a public safety net system. Additionally, the authors hope to advance the evaluation of CHW programs beyond process measures to include financial as well as health outcomes.

Methods of evaluating financial effectiveness. Several tools are available to help health care policy makers compare the costs and outcomes of alternative programs. Cost effectiveness analysis (CEA) is one method to evaluate costs and outcomes of interventions designed to improve health. A standard method of CEA was developed by a panel of experts organized by the U.S. Public Health Service.¹⁴ Cost effectiveness analysis assesses cost per unit of health effect, such as years of life gained, or number of cancer patients diagnosed, due to a particular intervention. The cost effectiveness ratio represents the cost of an additional unit of the outcome measure. Alternatives with the same outcome measure can be meaningfully compared and the lowest ratio represents the more efficient intervention.¹⁵ Although the Agency for Healthcare Research and Quality (AHRQ) supports research that uses CEA, at present the methodology is not universally used to make health care resource allocation decisions due to problems of quality, comparability, and the length of time required to capture complete financial data.^{16,17}

Return on investment (ROI) is also an effective way to evaluate financial outcomes and is used by many health plans and health systems to determine the monetary value of disease or case management programs.¹⁸ A common method of measuring the impact of disease management programs is the pre-/post-intervention comparison.^{19,20} Return on investment is the ratio of savings or net revenue enhancements as a result of a program divided by the program costs.¹⁸ Savings calculations should reflect all utilization and cost of health care services, including savings from reduced utilization (e.g., of emergency room visits or hospitalizations) and the offset for increased utilization of other services, such as primary care.^{21,22} Unlike CEA, ROI is purely a financial measure; upon comparison of programs, the larger the ROI, the more financially desirable the intervention.

Literature review. Two recent studies have examined the financial impact of CHW interventions, employing elements of the methods described above. Krieger et al.²³ assessed the effectiveness of a CHW intervention to decrease exposure to indoor asthma triggers among 274 households with children aged 4–12 years who had asthma. Community health workers provided in home assessments, education, support, and resources. Participants were randomly assigned to a high intensity or a low intensity group for the study. The high intensity group of 110 children improved significantly more than the low intensity group as measured by the caregiver quality of life score ($p=.005$) and decreased asthma-related urgent care use ($p=.26$). The savings in urgent care costs for the high intensity intervention group, during a two-month period, ranged from \$57 to \$80 per patient.

Fedder et al.²⁴ conducted a CHW outreach/case manager program for African American West Baltimore City Medicaid patients with diabetes (with or without hypertension) using CHW volunteers to improve patients' health care utilization. Over 27 months, 38 CHWs were assigned between 1 and 10 patients participating in the retrospective comparison study. The study cohort consisted of patients who received 5 or more CHW contacts, either by phone or in-home visit.

Health care utilization was measured for one year prior to and one year following the initial contact. Emergency room visits and hospitalizations were reduced by 39% and 30%, respectively. Medicaid charges were less, with reimbursements declining by 27%. The investigators report a savings of \$262,080 direct costs related to emergency room care and hospitalizations for the 117 patients. Further, a potential gross savings per CHW with a caseload of 30 patients was estimated at \$80,000 to \$90,000 per year.²⁴

A CHW program in a public safety net setting. Denver Health (DH) is the primary health care safety net for Denver and provides a majority of its care to uninsured and underinsured city and county residents. Denver Health Community Voices employs 12 CHWs to conduct culturally effective outreach with underserved residents in Denver neighborhoods and with special populations (such as pregnant women). The types of services they provide include community-based screening and health education, assistance with enrollment in publicly funded health plans, referrals, system navigation, and care management.

A robust evaluation was designed and implemented to assess attainment of program objectives. As the outreach program evolved and became more sophisticated, so did the evaluation. Originally, a Microsoft Office Access database was used to track CHW activities, contacts and performance. In 2003, DH trained its CHWs to use GoldMine, a sales and marketing database, purchased and adapted for the purpose of recording client interactions.

The types of data collected and entered into GoldMine by the CHWs include type of contacts, enrollments, educational presentations and events, community partners, client demographics, as well as number and types of services and referrals provided. Customized reports of each CHW's activities are generated monthly.

In 2004, evaluation was further enhanced by the application of methodologies to evaluate the financial impact of CHWs on the Denver Health system. For example, ROI was employed to evaluate cost savings associated with a free pregnancy-testing program conducted by CHWs and the outreach-based Men's Health Initiative (MHI). The MHI's two CHWs provide community outreach to poor men in Denver as a means of increasing their access to, the affordability of, and the continuity of health care services and of reducing sociodemographic health disparities. The CHWs provide multiple, tailored interventions to underserved men with a myriad of health concerns. The following section describes the ROI analysis, completed as a part of the overall program evaluation.

Methods

Denver Health's integrated information system includes a clinical, financial, and practice management system, an insurance enrollment management system, as

well as case management and managed care components. Each patient who receives services at DH is assigned a unique medical record number (MRN), which allows tracking all service use throughout the continuum of primary care, specialty care, emergency care, and hospitalization.

This MRN, third party insurance, and reimbursement status is recorded at every patient encounter with the integrated delivery system. Thus, patient encounters can be tracked by insurance payor to determine changes over time. (Changes are common among our underserved population, with its variable insurance eligibility status.)

When services are received, assigned charge codes allow tracking of use and patient charges. Reimbursements made towards accrued charges are assigned to each patient's account as part of the accounts receivable and reimbursement functions of the information system. For patients insured through capitated plans, reimbursements are not assigned to each patient but are rather estimated based on the anticipated reimbursement as a percentage of charges. Clients of the MHI are typically only eligible for and enrolled in one capitated program, the Colorado Indigent Care Program (CICP). This program is not considered a health plan, but is a state-funded adult sliding co-payment fee scale discount program, which historically reimburses 20% of charges.

For the purposes of this analysis, we examined utilization, charges, reimbursements, and payor sources for services utilized by CHW clients. Charge data are used because cost data are not available to us. However, costs are approximately 62% of charges and this cost-to-charge ratio is applied in the final ROI calculation.

A pre-/post- method was applied to examine the impact of the MHI CHWs on the DH system. The sample for the analysis consisted of all clients who began working with a CHW during the 18 months between January 1, 2003 and June 30, 2004 and had patient activity within the DH system prior to their initial involvement with the CHW. Pre-intervention baseline data consisted of clients' utilization and charges that occurred during the 9 months before the initial intervention of a CHW. Similarly, the clients' utilization and charges during the 9 months following the CHW initial intervention were analyzed as the post-intervention follow-up measures. The 18-month time frame was unique to each individual, based on the date of his entry into the MHI program. This time frame was chosen to ensure complete posting and reconciliation of patient visit, billing and payment information.

Pre- and post-intervention visits were classified as either primary care, urgent care (Emergency Department or Adult Urgent Care Clinic), outpatient behavioral health (mental health and substance abuse treatment), medical specialty care (e.g., Orthopedic Clinic, Eye Clinic, ambulatory surgery), dental, or inpatient. The total difference in charges and reimbursements was compared between pre- and post-intervention to establish the average monthly financial impact of the program. The average monthly cost of the program was determined based on CHW salaries and benefits and miscellaneous program costs, such as employee mileage reimbursement, bus tokens for clients, visit co-pays, and medical supply costs during the 18-month enrollment time period.

Results

Between January 1, 2003 and June 30, 2004, the CHWs initiated contact with 1,241 individuals. Of these clients, 347 men only had visits during the post-intervention time period and were excluded from the pre-post analysis. An additional 304 men had no visits in the system during either the pre- or the post-intervention time frame. The visits, charges, and reimbursements for the remaining 590 patients were extracted from DH's patient management and accounting systems for analysis. As seen in Table 1, the analysis sample was similar in race/ethnicity to the excluded group of MHI clients enrolled during the same time period. However, more of the men in the ROI sample were homeless or living independently, reported a diminished health status, and had a regular doctor. The ROI sample was also significantly older at intake.

The 590 patients were seen for a total of 5,211 visits during the pre-intervention time period and 6,630 visits during the post-intervention time frame. As seen in Table 2, relative to total visits, primary care and medical specialty visits increased, respectively, from 10% and 14% during the pre-intervention time frame to 14% and 21% during the post-intervention period. Furthermore, urgent care, behavioral health, and inpatient visits decreased from 15%, 55%, and 4% of total visits, respectively, to 12%, 48%, and 2%.

This change in utilization resulted in decreased total charges from pre-intervention to post-intervention. Care shifted from costly inpatient and urgent care with high mean charges per visit of \$16,872 and \$934 (median of \$9,692 and \$524) at pre-intervention to the less expensive primary care with mean charges per visit of \$237 at post-intervention (median \$123). Although 1,419 additional visits occurred following the MHI CHW intervention(s), total charges decreased by almost \$300,000.

As seen in Table 3, reimbursements did not differ substantially following the intervention. Pre- and post-intervention charges were reimbursed at a rate of 22% and 21%, respectively, with CICP providing more reimbursements than any other payor source (9% of pre-intervention charges and 11% of post-intervention charges). Uncompensated charges, calculated by subtracting total reimbursements (Table 3) from total charges (Table 2), totaled \$4,179,385 for the 5,211 visits that occurred in the 9 months prior to the CHW interaction and \$3,972,900 for the 6,630 visits that occurred in the 9 months after initial contact with the CHW. From pre- to post-intervention, uncompensated charges were reduced \$206,485 or, on average, \$22,943 per month. After application of the 62% cost-to-charge rate, an average savings in service costs of \$14,224 a month for the DH system was realized.

The total actual personnel cost, including salaries and benefits for the 18-month period of time for two CHWs was \$102,964. Other program costs (such as patient co-payments, medical supplies, and transportation costs) totaled \$9,165 for the 18-month enrollment time period. Therefore, CHW program costs totaled \$112,129, or \$6,229 per month.

Using the monthly savings to DH following the CHW intervention(s) and the monthly cost of the program, the ROI of the program is \$14,224 divided by \$6,229, or 2.28:1. Therefore, the DH system saves \$2.28 for every \$1.00 it invests in the MHI CHW program. This savings translates to \$95,941 annually.

A separate analysis was conducted to examine the 347 MHI clients who had patient activity only during the post-intervention period and were therefore, unavailable

Table 1.**DEMOGRAPHIC CHARACTERISTICS FOR SAMPLE OF CLIENTS FOR ROI ANALYSIS AND OTHER MEN ENROLLED IN THE CHW INTERVENTION (N=1,241)**

Characteristic	ROI Sample (n=590)	Other MHI Clients	Chi Squared (n=651)
Race/Ethnicity (%)			p=.68
African American	34	36	
Asian	1	1	
Hispanic	30	30	
Native American	3	2	
White	31	31	
Other/Missing	1	1	
Living Arrangement (%)			p<.01
Homeless	42	39	
Jail	22	33	
Independent	21	10	
Other/Missing	14	17	
Health Status (%)			p<.01
Good	28	39	
Fair or Poor	59	43	
Missing	13	18	
Regular Doctor (%)			p<.01
Yes	30	8	
No	66	84	
Missing	4	8	
Age at Intake (Mean Years (SD))	43.6 (10.9)	41.1 (12.1)	p<.01

their own control group (excluded from the pre- post-intervention analysis). The majority (82%) of these clients had activity within the DH system prior to the pre-intervention period of 9 months; 61 clients were new to the system following their enrollment in the MHI program. With 1,558 visits during the post-intervention period, the 347 men had a mean of 4.5 visits, substantially fewer than the mean of 11.2 visits for the 590 clients included in the pre- post-intervention analysis.

Post-intervention utilization patterns also differed between the two groups. As seen in Table 2, the pre- post-group accessed behavioral health services more than any other visit type during the post-intervention phase (48%). Alternatively, the group with no pre-intervention visits made more primary care visits than any other type (31%) and behavioral health constituted only 12% of their visits. Post-intervention inpatient care was consistent between the two groups and urgent care was lower in the pre-post group, at 12% of visits, than in the post-intervention only group (20%).

Table 2.**TOTAL VISITS AND CHARGES BY VISIT TYPE PRE AND POST CHW INTERVENTION (N=590)**

Visit Type	Pre-intervention			Post-intervention		
	Visits	Percent Visits	Charges	Visits	Percent Visits	Charges
Primary Care	516	10	\$104,634	946	14	\$224,135
Urgent Care	758	15	\$708,114	787	12	\$686,074
Behavioral Health	2,843	55	\$492,395	3,197	48	\$519,187
Medical Specialty	725	14	\$324,067	1,368	21	\$682,897
Dental	150	3	\$18,983	167	3	\$19,954
Inpatient	219	4	\$ 3,694,941	165	2	\$2,911,561
Total	5,211		\$ 5,343,135	6,630		\$5,043,808

These differences in the post-intervention utilization pattern did not substantially affect total charges; the mean charge per visit was \$761 (median=\$167) for the pre-post group and \$808 (median=\$187) for the post-intervention only group. However post-intervention reimbursements were significantly higher for the post-intervention only group at 45.2% of charges, as opposed to the 21.2% of charges for the pre-post group (as seen in Table 3). Because of the pre-post design, the charges and reimbursements of the post-intervention only group were excluded from the ROI calculations, but are described here as a part of the comprehensive program evaluation.

Discussion

This ROI demonstrates that the MHI CHWs have a positive financial effect on the DH system. As a result of CHW intervention(s), clients had increased primary and specialty care and decreased urgent care, inpatient, and outpatient behavioral health utilization. The increase in primary and specialty visits and decrease in charges are due to CHWs assisting clients with establishing a medical home, selecting a primary care provider, system navigation, and case management.

However, despite a decrease in charges, more than three-quarters of the charges remain uncompensated due to the lack of publicly funded insurance products for poor, uninsured men and the inadequate reimbursement rate of CICP (approximately 20% of charges). No systematic changes in financing or reimbursement occurred at the program, state, or federal levels to contribute to the shift in utilization.

In this public safety net system, demonstrating improved health outcomes alone is not sufficient in order to sustain programs. A positive ROI is also necessary for the organization to continue grant funded programs when grants end.

Limitations. Numerous obstacles to evaluating CHW programs have been previously identified and reported.¹² Indeed, the DH CHWs state that data entry

Table 3.**TOTAL REIMBURSEMENTS AND PERCENT OF CHARGES BY PAYOR SOURCE PRE- AND POST- CHW INTERVENTION (N=590)**

Payor Source	Pre-intervention		Post-intervention	
	Reimbursement	Percent Charges	Reimbursement	Percent Charges
CICP	\$504,058	9.4	\$547,895	10.9
Patient	\$9,806	.2	\$11,319	.2
Medicaid	\$235,633	4.4	\$220,026	4.4
Medicare	\$273,983	5.1	\$274,006	5.4
Commercial/ Contract	\$140,759	2.6	\$17,500	.3
Other	\$(490)	.0	\$161	.0
Total	1,163,750	21.8	\$1,070,907	21.2
Uncompensated Care	\$4,179,385	78.2	\$3,972,900	78.8

is time consuming and detracts from time that might be spent with clients. Additionally, the GoldMine software is complex, though CHWs at DH are well supported with training. Accessing, aggregating, and analyzing utilization, charge, and reimbursement data requires integrated information technology and significant evaluation expertise and time.

Calculating the financial impact of CHWs can be complex as methodological issues abound. For example, if the authors had identified a separate control group of men as the pre-intervention population, instead of using men as their own controls, the 347 men with only post-intervention data could have been included in this analysis. (Notably though, identifying a comparable control group of men within the DH database would present other methodological challenges.)

Currently, there are no consistently applied approaches to financial evaluation of CHW interventions and programs. In the absence of comparable methodologies, we must exercise caution in comparing programs or generalizing results.

Some might argue that ROI is not the most meaningful measure of true value of a program. For example, Rogoff advocates measuring return of community investment, which includes indirect cost savings, benefits to the larger community as well as return to individual stakeholders' investments.²⁵

Alternatively, Fetterolf et al. describe the development of a business case for care management programs and suggest that, in addition to financial modeling, other operational, quality-related, and intangible factors must be considered.²¹ Community health worker programs have relied entirely on these intangible, non-financial components for too long, and robust evaluations, including evaluations of not only health but also financial outcomes, are crucial to understand the impact of CHWs on health care delivery systems.

Conclusion

Community health workers improve the health of individuals and may improve the bottom line of safety net health care delivery systems. The above example provides evidence of the financial effectiveness of CHWs as a means of increasing access to care for underserved men and of promoting effective use of the health care system.

Evaluating and demonstrating a ROI or cost effectiveness for CHW services is necessary to ensure program sustainability, particularly in health care safety net systems, due to the large population of uninsured individuals and limited financial resources in most such systems.

State and federal policy recommendations include efforts to clearly define the role(s), training, and certification necessary to function as a CHW. Additionally, policy measures to establish public funding streams that support CHWs must be enacted. The completion and dissemination of further research on CHW contributions and financial effectiveness is required to inform health care policy reform.

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Notes

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