

Advancing Community Health and Wellness in Primary Care: A Bronx Community Based Organization's Experience Integrating Community Health Workers into Patient Centered Medical Homes within an Academic Medical Center

Kevin Fiori Jr., *Montefiore Medical Center, Bronx, NY; Children's Hospital at Montefiore, Bronx, NY*

Tashi Chodon, *Bronx Community Health Network, Bronx, NY*

Renee Whiskey, *Bronx Community Health Network, Bronx, NY*

Eleanor Larrier, *Bronx Community Health Network, Bronx, NY*

Jay Izes, *Children's Hospital at Montefiore, Bronx, NY; Bronx Community Health Network, Bronx, NY*

Sandra Braganza, *Montefiore Medical Center, Bronx, NY; Bronx Community Health Network, Bronx, NY*

Peter Selwyn, *Montefiore Medical Center, Bronx, NY*

Abstract

Community Health Workers (CHWs) contribute to increasing access to health services, promoting health education, and improving care coordination in low, middle and high income countries. The integration of CHWs into ambulatory health services, as members of a patient centered medical home (PCMH), provides an opportunity to optimize the impact of CHWs. This case study describes the experience of a community based organization's development of a CHW

Kevin Fiori Jr. is an Assistant Professor in the Department of Family and Social Medicine, Montefiore Medical Center, and an Assistant Professor in the Department of Pediatrics, Children's Hospital at Montefiore. **Tashi Chodon** is a Director of Programs at Bronx Community Health Network. **Renee Whiskey** is Community Health Programs Developer at Bronx Community Health Network. **Eleanor Larrier** is Chief Executive Officer at Bronx Community Health Network. **Jay Izes** is an Attending Physician in the Department of Pediatrics, Children's Hospital at Montefiore and Chief Medical Officer/Quality Improvement Director at Bronx Community Health Network. **Sandra Braganza** is an Assistant Professor in the Department of Family and Social Medicine, Montefiore Medical Center and an Assistant Professor in the Department of Pediatrics, Children's Hospital at Montefiore. **Peter Selwyn** is a Professor and Chair in the Department of Family and Social Medicine, Montefiore Medical Center. Please send author correspondence to kfiori@montefiore.org

model within ambulatory PCMH sites in collaboration with an academic medical center. Four key elements of the model, called the BCHN CHW Hub Model, are described, including: (1) health center site readiness, (2) CHW recruitment, training and deployment, (3) CHW scope of practice, and (4) ongoing CHW supervision and feedback. In addition, implementation results and considerations are discussed including key process indicators, limitations and future model directions. The BCHN CHW Hub Model can inform other programs and organizations focused on improving CHW program implementation.

Keywords

community health worker, care coordination, patient centered medical home, access to care

Background

In the decade both preceding and following the September 2000 Millennium Summit that lead to the Millennium Development Goals, there had been considerable progress in reducing poverty, preventing premature mortality, and extending life expectancy in low, middle and high income countries (World Health Organization, 2015). In the United States with the highest healthcare spending per capita, there has been relatively less progress in reducing morbidity and mortality compared to other high income countries, and there remain persistent differences in health outcome gains based on race, sex, and socioeconomic status (Centers for Disease Control and Prevention, 2013; Squires & Anderson, 2015). Recent health reform efforts in the US focused on innovations in health care delivery have supported new approaches in improving health outcomes and targeting health inequity (Blumenthal, Abrams, & Nuzum, 2015). There are opportunities for mutual learning and reverse innovations (Crisp, 2014) with US health systems importing practices from settings observing better health outcomes at lower costs (Singh, 2016). Community health workers (CHW) represent an innovative approach used globally to strengthening health systems. Describing the associated successes and challenges of developing and implementing a CHW program model in the US context will be our focus.

Brief History & Definition of CHWs

Dating back to the beginning of the 20th Century, CHWs have been an integral part of providing care to individuals living in poverty and without adequate healthcare access (Bhutta ZA, Lassi ZS, George Pariyo G, 2010). The American Public Health Association defines a CHW in the following way (Wennerstrom & Rush, 2016):

A community health worker is a frontline public health worker who is a trusted member of and/or has an unusually close understanding of the community served. This trusting relationship enables the worker to serve as a liaison/link/intermediary between health/social services and the community to facilitate access to services and improve the quality and cultural competence of service delivery. A community health worker also builds individual and community capacity by increasing health knowledge and self-sufficiency through a range of activities such as outreach, community education, informal counseling, social support and advocacy.

Similarly, the United States Department of Labor added 'Community Health Worker' as an occupation into the Standard Occupation Classification (SOC) system, defining CHWs duties as such (United States Department of Labor, 2010):

Assist individuals and communities to adopt healthy behaviors. Conduct outreach for medical personnel or health organizations to implement programs in the community that promote, maintain, and improve individual and community health. May provide information on available resources, provide social support and informal counseling, advocate for individuals and community health needs, and provide services such as first aid and blood pressure screening. May collect data to help identify community health needs.

Following the Declaration of Alma-Ata in 1978 and the subsequent movement for universal healthcare, a clear role for CHWs emerged and over the next two decades, large-scale, national CHW programs were developed in a number of nations, including Brazil, Bangladesh, Nepal, Peru, South Africa, Ethiopia and Pakistan, among others (Findley & Matos, 2015). Though these programs encountered numerous challenges and mixed success, CHWs continued to play a vital role in some healthcare systems. A 2014 estimate counted over 5 million CHWs working in communities throughout the world (Perry, Zulliger, & Rogers, 2014).

Role in Improving Health

There is growing consensus that CHWs have the potential to improve population health both in settings of (1) absolute poverty and limited resources and (2) resource abundance where large health inequities exist among communities (Singh & Chokshi, 2013). Existing data suggests that the use of CHWs has been associated with improved health outcomes over a range of areas (Lewin et al., 2010)(Findley & Matos, 2015). In the United States, the Centers for Disease Control and Prevention concluded that there is strong evidence to support the use of CHWs in chronic disease management, antiretroviral therapy for HIV, cancer screening, and asthma control (*Policy Evidence Assessment Report*:

Community Health Worker Policy Components, 2014). There is also mounting evidence that CHWs play a unique role in addressing health disparities and inequity in underserved populations, especially immigrant and minority communities (Findley & Matos, 2015).

Beyond impacts on health outcomes, there is evidence that CHWs also contribute to savings in health care costs. State-level reports from Massachusetts have described how CHWs are contributing to state health policy objectives associated with the *Triple Aim*—improving health outcomes, reducing costs, and improving patient experience (Bharel, 2015). Investments in CHWs have been shown to save healthcare costs. For example, a health center in New Mexico reported a savings of \$4 for every \$1 invested in a CHW program that focused on complex patients (Johnson et al., 2011). In Arkansas it was found that approximately \$3 was saved for every dollar invested in a initiative utilizing CHWs called the Arkansas Community Connector Program (Felix, Mays, Stewart, Cottons, & Olson, 2011). Approximately \$2.25 saved per dollar invested at Baltimore-based program (Singh, 2016). Globally, a recent report entitled, “Strengthening Primary Health Care through Community Health Workers: Investment Case and Financing Recommendations” concluded that the potential economic return on investment of CHWs in Sub-Saharan Africa could be as much as 10:1 (Dahn et al., 2015).

Regarding the use and adoption of CHWs within the US healthcare system, the number of active CHWs in the United States is estimated to be over 85,000 (Perry et al., 2014). The United States formalized the occupational role of CHWs within HRSA, Bureau of Health Professions in 2008 and the 2010 national census listed CHW as an occupation for the first time.

Despite the evidence supporting improved health outcomes and reduced costs associated with the use of CHWs through the US, there are also many challenges cited including the difficulty of integrating CHWs within a fragmented healthcare system (Franklin, Bernhardt, Lopez, Long-Middleton, & Davis, 2015), differences in standardized CHW scopes of practice (Findley et al., 2012), variations in expectations and requirements of CHW credentialing at state level (Miller, Bates, & Katzen, 2014), and challenges related to existing health financing opportunities. However, recent changes in healthcare policy and financing resulting from the Patient Protection and Affordable Care Act (ACA) and state specific programs such as New York’s Delivery System Reform Incentive Payment (DSRIP) program are facilitating innovation in healthcare delivery and providing new opportunities for CHW integration (Islam et al., 2015).

Need for Developing Models of CHW Integration

Considering the potential for impact on health outcomes and cost reduction, CHW program development and integration within healthcare delivery

models has never been more relevant. In a recent article, Singh and Chokshi described types of CHW models as (1) extensions of hospital or clinic systems, (2) health promotion programs of community based organizations, or (3) management entities within clinical and community organizations (Singh & Chokshi, 2013). Some authors suggest that a CHW *mixed model* of care, wherein a health plan/facility works in collaboration with a community based organization, provides several advantages (Findley & Matos, 2015).

To follow is a case study describing the initial 12-month experience of the Bronx Community Health Network's (BCHN) development of a CHW *mixed model*, referred to as the BCHN CHW Hub Model, that integrates CHWs within Patient Centered Medical Homes (PCMH) teams for Montefiore Health System in the Bronx, New York.

Methods—Case Description

Organizational Backgrounds

Bronx Community Health Network (BCHN) is a non-profit, community based organization that provides a broad range of programs and services designed to reduce disproportionately high rates of preventable chronic illnesses including hypertension, diabetes, obesity, asthma and HIV/AIDS among predominantly minority and immigrant Bronx populations. BCHN is also a federally funded health center that is rooted in the principles and tradition of the 50-year old United States community health center movement. Its mission incorporates the core principles of the movement: improving overall health status of medically underserved and economically disadvantaged populations regardless of demographic or socio-economic status; access to affordable, quality healthcare and resources; community involvement and representation in the planning and delivery of healthcare and related services that promote disease prevention, early treatment and healthy lifestyles (Geiger, 2005).

BCHN is located in Bronx County, a New York City borough with a population of 1,455,444. The Bronx ranked last of the 62 counties in NY state by overall health outcomes in 2015 (University of Wisconsin Population Health Institute, 2016). Over the past 20 years, BCHN has developed strategic partnerships with local, state and national public and private multi-sector agencies, community- and faith-based organizations, including health departments, academic centers, and major health care delivery systems. These partnerships bridge gaps between in-health center care and needed community-based, socio-economic resources to create a seamless, patient and community-centered, culturally relevant, comprehensive continuum of care.

Since its founding in 1996, BCHN has contracted with Montefiore Health System (MHS) for comprehensive, affordable, quality primary medical, behavioral and oral health care services. Starting with three health centers, there

are now 15 Montefiore Medical Group (MMG) community and school-based health center members of BCHN, serving 109,000 patients. Montefiore Medical Group offers comprehensive medical and specialty care in a multitude of medical specialties, diagnostics and education programs for every stage of life, for children to seniors at more than 20 locations in the Bronx and Westchester County. MHS is a premier academic medical center and the University Hospital for Albert Einstein College of Medicine. Combining a population health perspective that focuses on the health needs of communities with nationally recognized clinical excellence, MHS delivers coordinated, compassionate, science-driven care where, when and how patients need it most. MHS consists of six hospitals and an extended care facility with a total of 2,059 beds, and state-of-the-art primary and specialty care provided through a network of more than 150 locations across the region, including the largest school health program in the nation and a home health program.

As of 2016, BCHN directs three key initiatives, the pillars of its Community Health Promotion and Education Program. The first, an Emergency Department Diversion program based in the Emergency Room of the Jack D. Weiler Hospital at a local Emergency Department (ED) coupled with a Patient Navigation component, is designed to divert patients away from the ED and connect them with primary care providers in health center settings. BCHN ED liaisons discuss the health benefits of regular health care services provided by primary care doctors at health centers versus episodic care in emergency rooms, make appointments for ER follow-up care with assigned primary care doctors, and, as needed, assist with health insurance applications by application specialists. They discuss and promote disease prevention and early treatment and actively follow-up for compliance with primary care appointments and referrals made in the ED. The second is Racial and Ethnic Approaches to Community Health Champions (REACH-CHAMPS), a community-based, public/private multi-sector collaborative program that aims to reduce obesity and improve overall health and wellness of the Bronx's culturally and ethnically diverse population, targeting African American/Black and Hispanic/Latino communities. REACH CHAMPS implements six key nutrition, physical activity and clinical-community linkage initiatives that target policy, systems and environmental changes to facilitate sustainable health outcomes. The third is the CHW Hub Model, which is the focus of this article, and is described in more detail below.

BCHN CHW Hub Model

BCHN's first experience in developing a CHW program dates to 2012. From 2012-2015, two pilot projects were initiated and involved four CHWs focused on cervical cancer screening and outreach activities aimed at assisting patients with accessing healthcare services. Based on the experiences of the

initial program, the BCHN CHW Hub model was developed. This new model was launched in 2015 in partnership with Montefiore Medical Group at selected community health centers that are designated PCMHs, and members of BCHN. The objective of the partnership is to improve care coordination for patients enrolled at the sites, and health and wellness of the Bronx community, by integrating delivery of CHW community-based services into interdisciplinary PCMH teams. In collaboration with health centers' administrative and clinical leadership, BCHN recruits, trains, and deploys CHWs throughout the health centers to serve as a bridge between the patient/client population and the multidisciplinary clinical and social service patient care team providers. This model involves four key components: (1) Health center site readiness assessment and engagement, (2) CHW recruitment, training and onboarding/deployment, (3) CHW scope of practice, and (4) ongoing CHW supervision and feedback.

CHW Recruitment, Training & Onboarding: The priority of recruitment efforts is to find individuals from the community who have the passion to serve their communities. CHWs serve as representatives who have a unique understanding of the communities in which they serve, often belonging to the same culture, speaking the same language, and having similar life experiences. Their expertise facilitates engagement with individuals and populations that other professionals may have difficulty reaching and provides a deeper level of trust and understanding of the communities' barriers and facilitators to services. In terms of requirements, BCHN CHWs key requisite is that individuals be intimately familiar with the communities with which they will work. BCHN prefers individuals who have at least an associate degree from an accredited college in a health program, health education, public health or related field; or have commensurate experience in healthcare or human service related fields. Of note, all CHWs receive full salary and benefits and are members of the health care workers' union, 1199 SEIU United Healthcare Workers. All funding support for CHWs is dependent on ongoing grants managed by BCHN.

All CHWs complete a comprehensive, standardized training program that includes core skills such as care coordination, motivational interviewing, health coaching and navigating the healthcare system, and basic first aid skills including mental health First Aid and CPR. The general core training consists of a total of approximately 111 training hours per CHW. In some cases, CHWs receive specialized training to become certified as NYS Insurance Marketplace Application Counselors, Lactation Counselors, and Supplemental Nutrition Assistance Program (SNAP) assistants. In addition, the CHW supervisor identifies and coordinates additional trainings based on site needs and feedback. CHWs are matched with PCMH sites according to cultural and linguistic skills of that patient population and the skillsets needed for the site-specific initiatives.

Health Center Site Readiness and Engagement: Each collaborating health center in BCHN's network completes a need assessment survey designed to

identify current needs and barriers to patient care coordination and to help BCHN match CHWs according to health center needs. A follow up discussion on the findings is held with PCMH site leadership, during which the BCHN team outlines areas within standard BCHN CHW scope of practice that can be target based on site specific needs, ongoing health & wellness initiatives, and/or current quality improvement efforts.

CHW Scope of Practice: The BCHN CHW Hub model trains CHWs to focus on 4 distinct areas: 1) Active care coordination and linkage; 2) Healthcare and social service referrals and benefits enrollment; 3) Community health promotion; and 4) PCMH integration. Table 1 broadly classifies CHWs scope of work and the types of activities they perform daily.

Table 1

Summary of BCHN CHW Scope of Practice

Active Care Coordination and Linkage

- Follows up with patients who have fallen out of health care or patients deemed “high risk” by clinical team
 - Assists patients with meeting clinical plan needs and social service support including but not limited to escorting patients to appointments as needed
 - Facilitates in-network referral appointments as needed
 - Conducts in-home environmental and needs assessments, intake, screening, referrals and linkages
-

Healthcare & Social Service Screenings and Enrollment Assistance

- Conducts intake and screenings to determine patient eligibility for both clinical and social services (PHQ 2, SNAP eligibility, rent increase exemption programs, etc.)
 - Assists patients with health insurance enrollment into the NYS Health Marketplace
 - Facilitates patients with online application to social benefits programs and coordinates referrals to relevant community based resources (i.e. Food Pantries, Workforce training programs, housing assistance, etc.)
-

Health Promotion and Coaching

- Promotes health literacy and positive health behaviors
 - Conducts community health events with partner organizations
 - Provides education and supportive counseling to help community members reach health goals and remain engaged in ongoing healthcare (lactation counseling, chronic disease self-management, goal setting, etc.)
 - Facilitates chronic disease prevention and management workshops
-

Health Center Integration

- Serves as a core member of PCMH team
 - Provides contextual data about patients’ attitudes, behavior, environment, and barriers, which can inform ongoing clinical quality improvement efforts and individual care plan
-

Ongoing Supervision and Feedback: The “hub” term denotes the idea of centralized, ongoing supervision and coordination from an implementer, BCHN, who can provide standardization and have expertise in community health and wellness. This facilitates the optimization of roles between BCHN and PCMH teams: BCHN is responsible for overall management, ongoing trainings, supervision and direction of the CHWs, and the PCMH team providing ground level feedback to BCHN to enhance implementation processes and guide quality improvement. This partnership enhances PCMH team ability to make quality connections to community resources while also maintaining focus on clinical and psychosocial aspects of clinical care. The PCMH partnership with a CBO like BCHN fosters meaningful collaboration with multi-sector community providers and social service agencies.

Program Outcomes/Deliverables

BCHN CHW Hub model’s aim is to improve the overall health of patients and communities by improving patient care experiences through coordinating care and mitigating gaps in the healthcare system and addressing social determinants of health. By improving the overall health of patients/clients, the CHW hub model also aims to reduce healthcare related costs and inequity in access to both clinical and social services for Bronx residents. A simplified logic model for the program is displayed in Figure 1 including summarized activities and associated program metrics.

Results

We have described the essential elements of the BCHN CHW Hub model that was developed over a 3-year experience from 2012 to 2015. To follow is a summary from the first 12 months of full model implementation, from September 2015 to August 2016, including a discussion of program process indicators. As illustrated in Figure 1, process indicators for the model were organized to be associated with specific activities conducted and planned as part of the CHW hub model. In addition, as part of ongoing planning and improvement efforts focused on monitoring and evaluation of the model, we have included in Figure 1 a list of planned outcome measures that will be collected in 2017.

Table 2 summarizes process indicators for the 12-month period from September 2015 to August 2016. These data are derived from routine CHW, health center and organizational reports and are organized by the key model components (1) Health center site readiness assessment (2) CHW recruitment, training & onboarding/deployment (3) CHW scope of practice. These process data are depicted visually in a logic model (see figure 1).

CHW Recruitment, Training, and Onboarding: CHW recruitment took place prior to August 2015. Nine (9) CHWs were actively involved in the model as of September 2015. Each CHW was recruited following a competitive hiring

Inputs	Activities	Process Indicators	Planned Outcome Measures 2017-8
Financing	<u>Health Center Site Readiness</u> Conduct site needs assessment Identify health center contact person	<u>Health Center Site Readiness</u> Site assessments / Needs identified Health Center staff engaged in CHW management	<u>Health Center Site Readiness</u> % of needs "addressed" by CHW presence
Strategic Plan	Organize ongoing meetings/ coordinate supervision Develop CHW tools & workflows	Readiness meetings	
BCHN Staff	<u>CHW Recruitment & Training</u> Launch recruitment of CHWs search Review CHW applications Interview and select CHW	<u>CHW Recruitment & Training</u> Active CHWs	<u>CHW Recruitment & Training</u> Change in CHW upward mobility
Supervision Monitoring & Evaluation Administration Development/ Grants	Organize CHW training and onboard process	Training hours completed (per CHW) core & supplemental	CHW retention (3, 5 yrs.)
CHWs	<u>CHW scope of practice</u>	<u>CHW scope of practice</u>	<u>CHW scope of practice</u>
Salary Training	<u>Care Coordination / Linkage</u> Conduct LTF & "high risk" patient outreach Accompany patients with clinical care support/ navigation	<u>Care Coordination / Linkage</u> Patient encounters (phone/ clinic/home visits) Patients "followed" by CHW for care related activities	<u>Care Coordination / Linkage</u> % "effective" clinical & social service referrals % missed appointments
PCMH	<u>Enrollment & Access</u> Screen individuals for health insurance enrollment options	<u>Enrollment / Access</u> Health insurance screens Health insurance applications submitted Individuals enrolled in health insurance	<u>Enrollment / Access</u> New patients enrolled at health center attributable to CHW
Supervision Administration	<u>Health Promotion</u> Organize / conduct health education activities	<u>Health Promotion</u> Health activities (clinic & community) Health topics discussed Participants reached via activities	<u>Health Promotion</u> % change in health literacy / knowledge / attitudes % change health outcomes related to outreach activity
	<u>Health Center Integration</u> Participate in PCMH related meetings / activities Coordination of care with clinical team Link community resources / context to PCMH activities	<u>Health Center Integration</u> Unique types of health center meetings attended by CHW Average health center meetings attended weekly	<u>Health Center Integration</u> % change in PCMH staff knowledge of CHW role % change in provider awareness of community resources

Figure 1. BCHN CHW Hub Model Simplified Logic Model

Table 2

BCHN CHW Hub Model Key Activities & Process Indicators
Sept 2015-August 2016

Health Center Readiness	#
# site assessments conducted	8
# categories of needs identified	9
# health center staff directly engaged in CHW management	15
# readiness meetings held with health center staff	10
# PCMH sites where CHW(s) deployed	7
CHW recruitment, training, and onboarding	
# active CHWs	9
<i>Trainings completed per CHW/year</i>	
Core Training (48 unique topics)	111 hours
Supplemental Training (17 unique topics)	120 hours
CHW scope of practice	
<i>Active Care Coordination and Linkage</i>	
# patient encounters (phone/clinic/home visits)	6371
# patients contacted for patient outreach or enrollment	2319
# patients outreached for MyChart (online patient chart access)	578
<i>Enrollment & Access</i>	
# health insurance screens conducted	298
# health insurance applications submitted	183
# patients enrolled in health insurance	153
<i>Health Promotion</i>	
# health activities (clinic & community)	216
# of health topics discussed	28
# participants participating / reached via activities	3849
<i>Health Center Integration</i>	
# unique types of health center meetings attended by CHW	22
# average health center meetings attended by each CHW weekly	2

process that included resume review by BCHN Programs and Human Resource managers, in-person interview, and previous employment reference inquiries. Once hired, over the course of a few months every CHW received core training which covered approximately 48 unique training topics. On average, there were 111 hours of training per CHW per year. Based on both site need and grant funding focus, some CHWs received supplemental training, which involved an additional 120 hours of training on 17 unique topics.

CHW Scope of Practice: The scope of CHW activities varied based on the 9 active CHWs site specific needs and was organized into the following domains: (1) active care coordination and linkage (2) enrollment & access (3) health promotion (4) health center integration. Regarding active care coordination and linkage, CHWs worked with health center staff to coordinate care activities including clinical follow-up, appointment scheduling, social service outreach, and referral assistance. Over the course of the 12 months, 9 active CHWs conducted 6,371 patient encounters with 2,319 unique patients either in-person at health center or on the phone. CHWs assisted 578 patients in applying for online patient medical record access through an Epic electronic medical record software program called MyChart. In 2015, a strategic focus in New York City and State health initiatives was to assist individuals in obtaining health insurance and primary care access. CHWs conducted 298 health insurance screens to determine eligibility and submitted 183 applications for health insurance. As a result of these activities, 153 individuals obtained health insurance over the 12-month period. Health promotion activities were also a core function of CHWs activities and were carried out at both the individual, one-on-one level, and the group level via organized community activities. CHWs directed 216 health promotion activities over a range of 28 distinct health topics that reached over 3,849 patients. Figure 2 summarizes the proportion of time devoted to certain health promotion topics with most activities focusing on lifestyle changes and chronic disease management. Lastly, CHW integration within the health center is tracked by noting the number of health center meetings attended by CHWs. CHWs participated in over 22 unique types of health center staff meetings with an average of 1-2 meetings per week by each CHW. Their participation at these meetings aims to foster integration and collaboration with health center staff.

Stories from the Field

In addition to the quantitative data gathered from routine reporting, CHW managers routinely gathered feedback and input from CHWs and health center staff regarding the program's performance. There were multiple anecdotal accounts of how CHWs were impacting patients' lives. An example of a few of these anecdotes follow and were organized by core model areas to provide the reader additional descriptions of the BCHN CHW Hub Model:

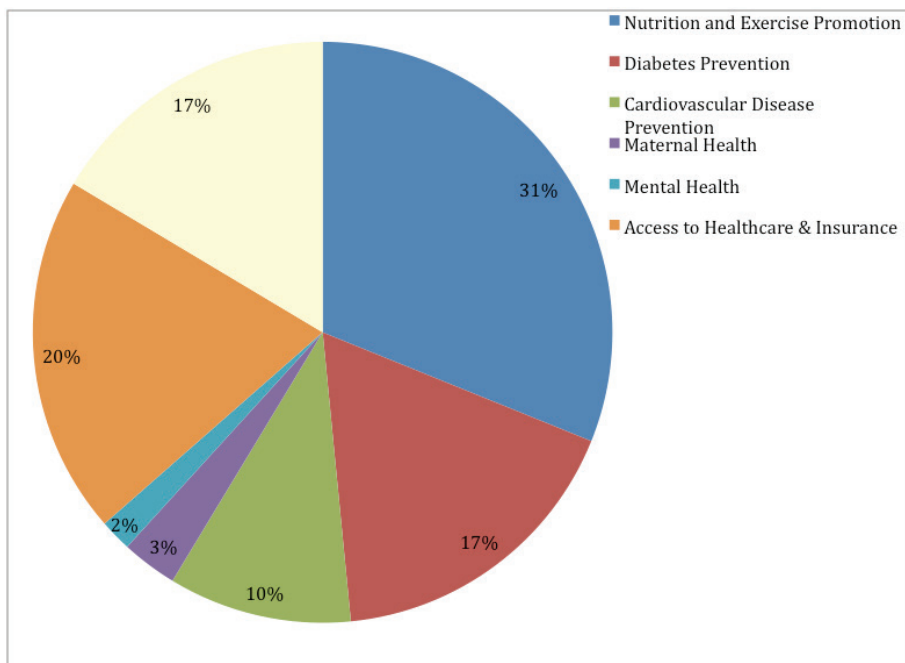


Figure 2. Health Topics Discussed by BCHN CHWs during Community Outreach Group Sessions August 2015-2016

Care Coordination: A patient with special needs was referred to a CHW by a social worker. The CHW assisted the patient throughout the process of a special housing application and accompanied the patient to multiple in-patient appointments, where the CHW served as an interpreter, helped the patient to complete paper work and helped the patient understand the application process. During one of the visits, the patient had a seizure. The CHW, based on her training remained calm, called an ambulance and the patient's primary care provider. When the emergency medical personnel came, the CHW provided them with information on the patient's medical history and medications. The next day, the CHW followed up with the patient and discussed the importance of taking anti-epileptic medications.

CHW encountered a pregnant patient at one of the health centers. This patient was eligible for many supportive social services including NYS WIC program. The patient was reluctant to proceed based on her immigration status. The CHW explained to the patient that she was eligible for WIC services and it would have no impact on her immigration status. The CHW facilitated the enrollment of WIC services including additional social services that the patient was eligible for.

Enrollment & Access: While conducting a diabetes workshop at a health fair, a CHW explained the benefits of regular health screenings and encouraged

attendees to get screened for diabetes and high blood pressure at the fair. One of her workshop attendees whom she managed to get screened had a very high A1C and blood pressure. The medical provider at the fair advised the client to go to the emergency room right away. The CHW encouraged the client to follow the doctor's advice, but followed up with the patient and explained importance of receiving regular primary care services and provided information about nearby health center. Later the patient showed up to enroll as a new patient at the health center where the CHW was stationed. The patient continues to be followed by a primary care physician at that site.

Health Promotion: One of the health activities includes a CHW who leads a walking group for the pre-diabetic patients at his assigned health center. The goal of this group is to help the patients lose weight and lower their blood sugar levels. The CHW meets the patients every Wednesday morning at the health center's waiting area. The group then walks to a nearby farmers' market where participants can purchase fresh fruits and vegetables. On one Wednesday morning when the CHW was not available, the group continued the regular walk in his absence.

Health Center Site Readiness/Engagement: One of the health center site administrators commented that the addition of CHWs had added real value as PCMH team members. There are significant improvements to clinic operations and enhancement to the patient health center experience and their own quality of life. For example, CHWs have opened access for licensed social workers to provide mental health services. The LSWs can now limit their time spent with finding concrete services for patients, because CHWs can better address these needs. They can help patients navigate agency and community systems for housing, career, food, and educational resources. Integration of CHWs took an investment of time and relationship-building to educate patients and staff about CHW roles, including presentations to staff, creation and implementation of a referral form outlining their services, and reminders for participation in daily/weekly care huddles. This site administrator concluded that the interdisciplinary PCMH care team of clinical providers, nurses, behavioral health specialists, administration, now happily includes CHWs. The team acknowledges the significant role CHWs play in bridging the gap between the clinical and social aspects of health.

Discussion

We have described our experience in developing a CHW program model, termed the BCHN CHW Hub model, which integrates CHWs within ambulatory PCMH teams. This ongoing collaboration provides an example of a *mixed model* for CHW utilization in health service delivery involving a community based organization, BCHN, and an academic medical system, MHS. Following the availability of new funding in 2015, the latest iteration of the BCHN CHW

Hub model was launched with 9 CHWs located at 7 distinct ambulatory health centers. The initial 12-month results of this new model were considered successful by collaborative partners, BCHN and MMG PCMH centers, noting the added value that CHWs brought to patient care. Examples of this added value include assisting in health insurance enrollment, facilitating follow-up appointments for both clinical and social services, providing health education, and serving as a link to the community.

The BCHN CHW Hub model also demonstrated a mixed model approach to CHW integration. Collaboration by PCMH sites with community based organizations (CBOs), like BCHN, reinforced linkages to the community served. CBOs are in the unique position to foster and retain partnerships with community members, local organizations, and resources. This is a clear advantage they can offer to health sites through the mixed model approach. Though not impossible, the ability for large health organizations to retain a community link can prove challenging, hence effective partnerships with CBOs imbedded in catchment populations provide an opportunity to retain a community-based connection. The work of the CBO/CHW frees clinical and professional team members to focus on their areas of expertise with the patient in the center. The CBO can identify community resources, spend time with and engage in discussion, and navigate health and social support systems with patients and their families.

Though we acknowledge that there has been progress in development of the BCHN CHW Hub model, there are many limitations and opportunities for improvement that have been and will continue to be identified. Over the next year, the BCHN and PCMH site teams are committed to strengthening multiple aspects of the model including but not limited to the following. First, the team plans to augment ongoing efforts to integrate CHWs within the health centers. Integration of a new team member always poses challenges, and the role of a CHW is new to many US health providers and/or administrative staff. The BCHN experience has shown that there remains more work ahead in delineating CHW's overlapping roles and scope of practice vis a vis social workers or administrative personnel and optimizing the added value CHWs bring to patient care. Next, all CHWs within the model have salaries and benefits that are dependent on grant funding, which remains unreliable and complicates efforts to fully integrate and standardize the role of CHWs. For example, distinct grants come with unique deliverables, so CHWs have different areas of focus creating further challenges to integration. To optimize integration with health center sites, it would be preferable to have reliable reimbursement options for CHW services within existing or future payment models. Adding CHWs to health center budgeting might require developing the business case specific to an organization's context and needs, and such activities involve either including return on investment and/or cost effective analysis. Though there is

evidence of cost-savings associated with CHWs, there remains more work to be done in this area. Lastly, as briefly mentioned in the results section, this case study described only process indicators from the 12-month time-frame without outcome data, though as listed in Figure 1, efforts are underway to revise monitoring, evaluation and quality activities over the coming year with a goal of tracking patient outcomes. These efforts will be facilitated by full integration of CHWs within the current electronic medical record system enabling patient level data analytics for patients served by CHWs. In addition, noting the growing population health focus of Montefiore and the importance of social factors, there are plans to invest in an analytic platform that would enable better tracking of effective social service referrals and uptake. Future research is planned and needed to assess how CHWs may impact social service uptake and how that affects patient outcomes.

There is a growing body of evidence supporting the effectiveness of CHW integration to improve health outcomes and reduce costs in resource-limited settings. In an important example of reverse innovation, US-based primary healthcare institutions are beginning to acknowledge the advantages to be gained from integrating CHW models into primary healthcare delivery sites. The BCHN CHW Hub model provides an example of one such experience in a resource-limited community in the US. While further research is needed, CHW integration within primary healthcare clinics could accelerate improvements in health outcomes, while reducing healthcare costs, across settings globally, including in the US.

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