
Translating a Proven Pediatric Healthy Homes Asthma Intervention to Adults

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Asthma is a serious public health concern, disproportionately affecting urban, minority populations. Chicago's West and Southwest sides are among the most burdened by asthma and environmental conditions that exacerbate asthma. Home-based, community health worker (CHW)-led interventions have repeatedly demonstrated effectiveness in addressing pediatric asthma. However, evidence of such interventions among adults is limited. Helping Chicago's Westside Adults Breathe and Thrive is a longitudinal cohort study that assesses the effectiveness of a CHW-led asthma and healthy homes intervention for adults. One of the first of its kind, the program aims to improve asthma control and quality of life among adults with poorly controlled asthma. This article provides a framework for implementing the intervention from start to finish. CHWs make five or six home visits over the course of 12 months, providing comprehensive and individualized asthma education to study participants. They work closely with participants to conduct home environmental assessments, collaboratively developing techniques to eliminate or avoid asthma triggers. They also assist with smoking cessation, comorbidities, and health system navigation. Between December 1, 2013, and August 31, 2015, 202 participants enrolled in the program. This article reports on successes, challenges, and recommendations from the program's first 21 months of operation.

Keywords: asthma; chronic disease; community intervention; health disparities; health

education; health promotion; lay health advisors/community health workers; program planning and evaluation

► INTRODUCTION

One in 12 people, or 25 million, nationally have asthma, of which 73% are adults (Akinbami et al., 2012). The prevalence of asthma is rising, with studies documenting a disproportionate increase in mortality and hospitalization rates among urban residents (Akinbami et al., 2012; Akinbami, Moorman, & Liu, 2011). Studies consistently show elevated asthma

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prevalence, morbidity, and mortality among non-Hispanic Black (NHB) people and those living below the federal poverty level, with age-adjusted mortality rates 3 times greater for NHB persons than for non-Hispanic White persons (Akinbami et al., 2011; Carter-Pokras, Offutt-Powell, Kaufman, Giles, & Mays, 2012; Frieden, 2011; Gupta, Carrion-Carire, & Weiss, 2006; Margellos-Anast & Gutierrez, 2011; Zahran, Bailey, & Garbe, 2011).

Chicago, and specifically its Westside and Southside communities, is particularly burdened by asthma (Gupta, Zhang, Sharp, Shannon, & Weiss, 2008; Margellos-Anast & Gutierrez, 2011; Naureckas & Thomas, 2007; Shah, Whitman, & Silva, 2006; Targonski, Persky, Orris, & Addington, 1994; Thomas & Whitman, 1999). The largest door-to-door health survey in Chicago's history (Shah et al., 2006; Whitman, Shah, & Benjamins, 2004, 2010) revealed that in these poor, primarily NHB communities, 18% of adults had physician-diagnosed asthma, a rate considerably higher than the 11% of U.S. and 13% of Chicago adults at that time (Centers for Disease Control and Prevention [CDC], 2009). NHB Chicagoans are almost 8 times more likely to die from asthma, 9 times more likely to visit the emergency department (ED), and 6 times more likely to be hospitalized for asthma than are non-Hispanic White Chicagoans (COMPdata, 2012).

Home-based, multicomponent interventions with an environmental focus on reducing asthma morbidity have consistently been shown effective among children with asthma living in underserved communities (Crocker et al., 2011). However, the evidence concerning the feasibility and effectiveness of such interventions with adults is limited (Krieger, Song, & Philby, 2015). One small randomized trial of home visits carried out by respiratory therapists showed improvement in quality of life but not in clinical outcomes (Shelledy, Legrand, Gardner, & Peters, 2009), and another study where home visits were carried out by a nurse found that the home visit interventions may have an effect on asthma-specific quality of life but had no effect on symptom control (Smith et al., 2005). A Chicago pilot study testing a 6-month community health worker (CHW) adult asthma intervention documented improvements in participants' quality of life, however, had difficulty examining other outcomes due to the short intervention time (Martin et al., 2009). Federman et al. (2015) describes the process for implementing a CHW home-based intervention for adults 60 and older in a randomized control trial format; results are yet to be published. The only study that has examined a 12-month, CHW, healthy homes (HH) intervention for adults found significant improvement in asthma control

and quality of life among enrolled adults but no significant reduction in urgent health resource utilization, concluding that additional studies are needed (Krieger et al., 2015).

Helping Chicago's Westside Adults Breathe and Thrive: A Healthy Homes Approach to Improving Respiratory Health (HCWABT) is a 12-month, CHW-led, home-based, asthma and HH intervention for adults with poorly controlled asthma. The study, funded by the U.S. Department of Housing and Urban Development, addresses a critical knowledge gap: whether this intervention that has been proven effective among children (Crocker et al., 2011; Krieger, Takaro, Song, & Weaver, 2005; Margellos-Anast & Gutierrez, 2011; Nicholas et al., 2005) can be successfully translated to adults. It further adds to the evidence base initiated by Krieger et al. (2015) on the feasibility and effectiveness of the home visit model among adults. While Krieger et al. uses a randomized control trial design to examine the efficacy of an adult intervention approach, HCWABT focuses on the applicability and effectiveness of the model in practice, incorporating fewer exclusion criteria. This article describes the process of translating a proven pediatric intervention model to adults living in Chicago's most underserved communities, the challenges encountered in the translation, and the modifications that were made in response to these challenges.

► METHOD

Program Overview

Informed by social cognitive theory (Baranowski, Perry, & Parcel, 1997) and the transtheoretical model (TTM) of behavior change (Prochaska, Redding, & Evers, 1997), HCWABT uses environmentally focused and comprehensive education strategies to improve outcomes for adults with poorly controlled asthma living in Chicago's West and Southwest side communities. The intervention seeks to empower adults with asthma to make the changes needed to better manage the disease and improve their quality of life. The program is carried out by the Sinai Urban Health Institute (SUHI), the community-based research arm of the Sinai Health System (SHS) located in Chicago's urban, impoverished Westside. The Chicago Housing Authority (CHA), providing housing to more than 50,000 families and individuals in the city of Chicago, is a key partner, playing an instrumental role in assisting HCWABT staff in building relationships vital to both recruitment and program implementation with CHA residents.

Program Staff

Under the direction of SUHI's Director of Asthma Initiatives, the HCWABT team consists of (1) an epidemiologist, who oversees data collection and analyzes study data; (2) an intervention coordinator, responsible for hiring, training, and supervision of CHWs and managing day-to-day program operations; (3) a research assistant (RA), responsible for data collection, entry, cleaning, and management; and (4) two CHWs who serve as the main agents of the intervention, responsible for community outreach, recruitment, home visits, and case management.

CHW Hiring/Training

CHWs were hired from the communities served by the intervention. In addition to living in the community, CHWs were required to have a high school diploma or GED and demonstrate a passion for improving the well-being of community members. Potential candidates were invited to attend a 1½-day prehire session where they are assessed for key CHW characteristics. Once hired, each CHW participated in a 75-hour, rigorous asthma training facilitated by a senior CHW and the intervention coordinator, who is a Certified Asthma Educator. Asthma-related training topics included asthma basics, medication and device use, triggers, and warning signs and symptoms. A more extensive home environmental training was conducted by the Metropolitan Tenant's Organization, focusing on the "Seven Principles of Healthy Homes" as defined by the National Center for Healthy Housing, along with strategies for conducting thorough home environmental assessments. CHW core competency topics included patient self-management, motivational interviewing, patient documentation, goal setting, and collaboration with medical professionals. The evaluation process for CHWs' preparedness and competency included three levels of role-play and home visit shadowing by the intervention coordinator, using the CHW Education Evaluation Tool. For ongoing quality assurance purposes, CHWs are shadowed and evaluated at random every 2 to 3 months by the intervention coordinator. This is the same training that has been implemented for pediatric interventions, with the exception of modifying asthma-related data to reflect the adult population instead of children.

Recruitment

The goal was to enroll 200 adult participants. To be eligible, participants had to (1) be 18 years or older, (2) reside in one of nine prioritized zip codes, (3) have

physician-diagnosed asthma, and (4) meet the National Heart, Lung, and Blood Institute's (n.d.) criteria for uncontrolled asthma, excluding spirometry (National Asthma Education and Prevention Program, 2007). Exclusion criteria included (1) having participated in another asthma program within the past year, (2) plans to move out of Chicago during the intervention, or (3) diagnosis of congestive heart failure or lung cancer.

Recruitment methods were split between direct publicity to possible study participants with the intent that they would self-refer, and publicity to those who directly interact with possible study participants (e.g., health care providers, case managers) to solicit referrals. Among the initial recruitment methods directly to potential participants (i.e., soliciting self-referrals) was a mailing to 1,248 CHA Housing Choice Voucher (HCV) residents (low-income families with a voucher that allows them to rent in the private market, with a portion of the rent paid by CHA) living in the priority zip codes. Recruitment methods intended to solicit referrals via those who serve possible participants included receipt of referrals from case managers at CHA housing developments, outpatient clinics, and Mount Sinai Hospital's (MSH) ED. The latter were generated via the electronic medical record (EMR) system, which sent a notification to the RA managing recruitment. The study's medical director, along with his team of adult pulmonologists at SHS also referred potential participants from an SHS outpatient respiratory clinic as well as inpatient floors of the hospital. Potential participants were screened by the RA via phone to ensure that they met eligibility criteria, and then a baseline visit was scheduled with those who agreed to participate. Those that were not eligible to enroll were offered a onetime home visit from a CHW, who could cover asthma basics and answer any specific questions they may have about their asthma management.

Intervention

The intervention phase of the study is ongoing, with the last participant scheduled to complete the 12-month intervention in August 2016. CHWs conduct six home visits for each enrolled participant over the course of the year. The RA accompanies the CHW on the baseline visit to consent participants and collect data. Once the RA completes data collection, the CHW begins providing asthma education and addresses any immediate needs for referrals. For a full process time line including CHW hiring and training, evaluation of CHW preparedness, recruitment, screening, and enrollment, see Figure 1.

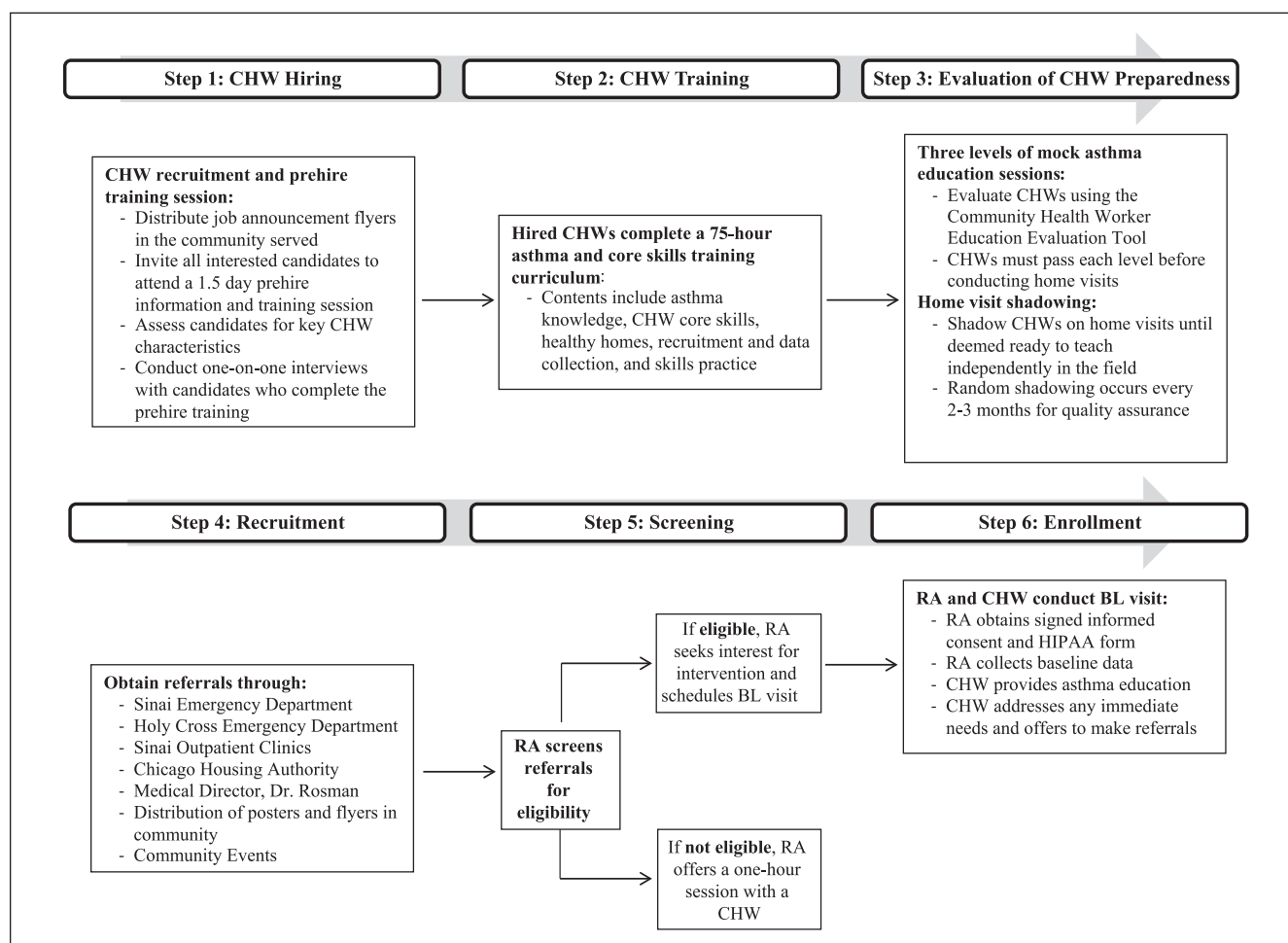


FIGURE 1 Time Line of Helping Chicago's Westside Adults Breathe and Thrive Process

NOTE: CHW = community health worker; RA = research assistant; BL = baseline; HIPAA = Health Insurance Portability and Accountability Act.

After the baseline visit is completed, subsequent visits occur at 2 weeks, 3 months, 6 months, 9 months, and 12 months postbaseline. The RA also calls participants monthly and attends the 12-month visit to collect data. Home visits last approximately 2 hours, and CHWs provide individualized asthma self-management and HH education. The home visit education model is based on the concept of social cognitive theory—that people learn by observing others and that behavior is influenced by their environment, the behaviors they witness, and the way they think about those behaviors (Baranowski et al., 1997). Education topics include asthma pathophysiology, symptoms and symptom recognition, triggers, purpose of quick-relief and controller medications, correct use of medications and devices, and proper use of an Asthma

Action Plan. CHWs demonstrate correct use of devices at each visit and ask participants to return the demonstration. The teach-back method is used to ensure understanding of each topic. Educational materials are also provided to each participant in order to reinforce topics learned during the session.

CHWs conduct home environmental assessments at the 2-week, 6-month, and 12-month visits to identify possible asthma triggers in the home and teach trigger reduction strategies. If needed, the CHW assists participants in addressing home environmental issues by working closely with the participants' landlord/management company; Metropolitan Tenant's Organization is consulted in challenging situations. CHWs work with participants at the end of each home visit to set SMART goals (Doran, 1981)

that assist in the behavior change process, determine barriers that may keep them from reaching their goals, and assess how confident the participants are that they can reach the goals they set. Goals are individualized and set based on where the participant is with regard to changing a certain behavior, for example, smoking cessation. Subsequent goals build on each other to help the participants through the stages of change. This process is based on the TTM theory that people move through a series of stages when modifying behavior and that change occurs gradually over time (Prochaska et al., 1997). CHWs also assist in system navigation, including providing linkage to health insurance enrollment services via the SHS Affordable Care Act (ACA) navigation program, finding a primary care provider, and referring to other health and social services as needed.

Data Collection and Analysis

The data presented were collected by an RA. The RA asked questions regarding demographics, disease history, smoking status, and insurance. The COPD Assessment Test (CAT) was administered to measure level of control among those with chronic obstructive pulmonary disease (COPD), and the COPD Population Screener was used to assess risk of COPD among those without a diagnosis (Jones, Harding, Berry, et al., 2009; Jones, Harding, Wiklund, Berry, & Leidy, 2009; Martinez et al., 2008). Data were analyzed using SAS, Version 9.3. SHS's institutional review board (IRB) reviewed and approved the study protocol.

RESULTS

A total of 202 participants were enrolled between December 1, 2013, and August 31, 2015. This was a 6-month extension to the original proposed recruitment period (21 months vs. originally planned 15 months). To reach our goal, slower than anticipated early recruitment was addressed in the following ways: (1) the service area was expanded (adding three contiguous zip codes with similar demographics and asthma prevalence as the original six); (2) CHWs marketed the study by offering asthma basics and program awareness group sessions to interested adult residents at public housing developments; (3) CHWs and other program staff attended several community events to reach potential adult participants that may not have otherwise been reached via electronic referral or mailing; and (4) a second mailing to 3,858 HCV residents living in all nine project zip codes (including the three added) was sent out.

TABLE 1
Sources and Outcomes of Referrals for Helping Chicago's Westside Adults Breathe and Thrive

Referral Source	Total Referrals	Enrolled	
		n	%
Chicago Housing Authority	59	19	32
Housing Choice Voucher ^{a, b}	184	55	30
Sinai emergency department	380	51	13
Sinai hospitalization	14	1	7
Holy Cross emergency department	61	4	7
Physician	20	3	15
Outpatient (NextGen)	232	34	15
Community event	66	7	11
Other (word of mouth, poster, etc.) ^b	79	28	35
Total	1,095	202	

^aHousing Choice Voucher residents are low-income families with a voucher that allows them to rent in the private market, with a portion of the rent paid by the Chicago Housing Authority. ^bIndicates that this referral source is a self-referral, meaning that participants saw or received information about the program and took the initiative to call in and enroll themselves. Other referral sources were initiated by a provider or case manager.

The largest number of referrals came from MSH's ED ($n = 380$), but with only 13% of those referrals being enrolled, this was one of the least efficient methods of reaching participants (Table 1). The most efficient methods of recruitment proved to be referrals from CHA buildings—19 of the 59 referrals were enrolled (32%); HCV mailings—of the 5,858 letters sent, 184 responded and 55 were enrolled (30%); and self-referrals from posters or word of mouth—28 of the 79 that responded to this source were enrolled (36%). Electronic referrals from the ED, hospital, physicians, and outpatient clinics, as well as meeting adults at community events, were not efficient referral sources (7% to 15%). The referrals from the hospital and ED were not as efficient due primarily to the quality of contact information.

When considering recruitment from the ED, it was necessary to balance the risk of calling potential participants who would prefer not to be contacted against the risk of receiving very few referrals if we relied on active self-referral from patients or referrals from busy ED staff. To address this, following consultation with

the IRB, a modification was made to the initially proposed ED recruitment process. Patients were given materials concerning the study at ED discharge and had the option of opting out of being contacted. If they did not opt out, a referral was sent to the study. Active consent for the referral was waived by the IRB. To avoid putting undue burden on outpatient physicians to manually screen patients for eligibility, a modification was also made to improve efficiency of the outpatient referral process. Within outpatient clinic EMR systems, a pop-up describing the HCWABT program was created, allowing providers to easily refer adult patients with asthma who lived within the designated zip codes.

Of those enrolled, 184 (91%) were NHB, 149 (73%) were female, and 73 (36%) were over the age of 55 years (Table 2). Sixty-four percent (129) of participants reported their highest level of education as high school or below, and 67% (136) reported their annual household income as \$20,000 or below. The majority of the participants (80%) had Medicaid or Medicare insurance, and 11% reported having no health insurance.

Mental illness and drug use were frequently encountered. Some participants reported having a diagnosis of mental illness ($n = 20$), but many more displayed or reported symptoms without any official diagnosis or treatment plan. The CHWs also frequently reported signs of illicit drug use during home visits, with some participants openly disclosing these habits ($n = 19$). In some cases, drug use activities prevented CHWs from completing a home visit due to safety concerns. To help address immediate needs, participants were connected to services in the community, such as food pantries or assistance programs as needed. In addition, the SHS ACA navigation team helped participants enroll in health insurance.

Over one quarter of participants (28%, $n = 56$) had a COPD diagnosis in addition to asthma, and of those with a COPD diagnosis, the majority (91.5%) tested high or very high on the CAT, indicating poor health status. While we knew we would encounter people with the asthma–COPD overlap syndrome, the number along with the severity exceeded our expectations. We therefore needed to better equip the CHWs with the ability to assist participants with understanding COPD and to provide disease management support. Toward this goal, the CHWs received a two-part COPD training approximately 6 months into the intervention. Seventy-three participants (51% of those that did not report a COPD diagnosis) were found to be at risk for COPD per the results of the COPD Population Screener (Table 3). All participants with COPD, as well as those found to be at risk, were strongly encouraged to see a pulmonologist for appropriate testing and follow up care.

TABLE 2
Helping Chicago's Westside Adults Breathe and Thrive
Participant Demographics ($n = 201$)^a

<i>Demographic</i>	<i>n</i>	<i>%</i>
Race/ethnicity		
Non-Hispanic Black	184	91
Mexican	5	3
Other Hispanic	5	2
Other	7	4
Gender		
Male	54	27
Female	147	73
Age ^b (years)		
18-34	35	17
35-44	45	22
45-54	48	24
55+	73	36
Highest level of education		
<High school	62	31
High school grad	65	32
Vocational school	13	6
Some college	55	27
College or higher degree	5	2
Household income (\$)		
<20,000	134	67
20,000-<40,000	33	16
40,000+	4	2
Don't know/refused	30	15
COPD diagnosis		
Yes	55	27
Current smoker		
Yes	83	41
Lives with a smoker		
Yes	121	60
Insurance status		
Medicaid/Medicare	160	80
No insurance/self-pay	23	11
Private insurance	2	1
Other	5	2
Don't know	11	5
Mental illness		
Yes	20	10
Illicit drug use		
Yes ^c	25	12

NOTE: COPD = chronic obstructive pulmonary disease.

^aMissing data for one participant where environment was not safe for data collection. ^bThe median age was 48 years and the interquartile range was 40-58 years. ^c19 of these participants disclosed this information and in 6 of these cases, habits were observed.

TABLE 3
Selected Characteristics, Including COPD Severity and Risk, by COPD Status

<i>Characteristic</i>	<i>COPD (N = 55), n (%)</i>	<i>Non-COPD (N = 146), n (%)</i>
Age (years)		
Median	56	45
Interquartile range	47-64	35-55
Current smoker		
Yes	25 (45)	58 (40)
Insurance		
Medicaid/Medicare	47 (85)	113 (77)
No insurance/self-pay	3 (6)	20 (14)
Private insurance	0 (0)	2 (1)
Other	1 (2)	4 (3)
Don't know	4 (7)	7 (5)
COPD Assessment Test		
Low	1 (2.1)	n/a
Medium	3 (6.4)	n/a
High	21 (44.7)	n/a
Very high	22 (46.8)	n/a
COPD Population Screener		
0-4 (no COPD)		71 (49.3)
5-7 (likely to have COPD)		56 (38.9)
8-10 (very likely to have COPD)		17 (11.8)

NOTE: COPD = chronic obstructive pulmonary disease.

Smoking is another common issue, with 41% reporting that they smoke cigarettes. Although somewhat higher than expected, this issue was anticipated based on previous interventions. CHWs were trained initially and early on in the intervention by local lung health organizations to provide basic smoking reduction and cessation to participants. In addition to modifying the CHW training to include COPD, training modules on other common comorbidities including mental illness, substance abuse, diabetes, and obesity were also added early on in the intervention.

► DISCUSSION

The translation of this pediatric CHW asthma and HH intervention to an adult population required several important modifications: expansion of recruitment methods, efforts to assist participants with COPD and substance abuse, an increased need for smoking

cessation and mental health services, attention to other common comorbidities, and linkage to health insurance enrollment services.

Successes

The HCWABT program translated a 12-month pediatric CHW asthma and HH model to adults living in an underserved, urban community. To date, there has only been one similar asthma and HH intervention for adults with published outcomes (Krieger et al., 2015). Federman et al. (2015) describes the process for implementing a CHW home visit model for adults over the age of 60 years. Both studies, along with HCWABT, further test the effectiveness of the CHW home visit model among adults. However, while Krieger et al. (2015) and Federman et al. (2015) focus on the efficacy of the intervention and include several exclusion criteria (e.g., COPD, some mental or physical disabilities, chronic diseases), HCWABT has substantially fewer exclusions, therefore addressing the real-world applicability of the intervention approach (Federman et al., 2015; Krieger et al., 2015).

In order to translate the model to adults, SUHI's CHW training methodology needed to be tailored to focus on adult asthma. Modules were thus added on common comorbidities including COPD, mental illness, substance abuse, diabetes, and obesity. Program protocols including the number, content, and structure of home visits, data collection, and quality assurance activities were easily translated for the adult intervention.

While the majority of children in pediatric interventions are covered by insurance, this was not true for adults. The partnership with SHS's ACA navigation team facilitated the enrollment of uninsured adults into health plans. This led to coverage for the majority of previously uninsured participants and also allowed many participants who had not visited a primary care physician in years to be linked to a primary care physician, learn health system navigation, and be coached on using their insurance policy.

HCWABT provided confirmation of the suspected high prevalence of COPD in the communities served. The CAT and COPD Population Screener (Jones, Harding, Berry, et al., 2009; Martinez et al., 2008) helped ensure that participants with a COPD diagnosis had the opportunity to learn more about their level of control of the disease and that participants at risk for COPD were referred for further evaluation. The tools also provided an opportunity for CHWs to educate on COPD, raising overall awareness of the disease.

Overall, CHWs themselves played a significant role in the translation of the model from children to adults,

via their exceptional ability to build relationships with their clients. CHWs are often able to relate to the specific challenges faced by adults living in their communities and therefore quickly establish a foundation of trust (Brownstein, Hirsch, Rosenthal, & Rush, 2011; Herman, 2011). This trust is vital not only to the completion of home visits but also to participants' receptivity to sharing information and making behavioral changes to improve asthma management and overall health and well-being (Krieger, 2009).

Challenges/Barriers

Recruitment was a challenge throughout the enrollment phase. To address this, a wide range of recruitment strategies were implemented, some of which were not included in the original intervention plan. Initial efforts via mailings yielded many participants; however, a significant drop in enrollment followed. The ED yielded the highest number of referrals, yet only 13% of referrals were ultimately enrolled in the program. Those referred from the ED were hard to reach via phone, and even after enrollment they remained challenging to keep engaged, often ultimately becoming lost to follow up. Among suspected reasons for difficulty connecting with this population, compared to our pediatric interventions, was a lack of accurate contact information in their hospital record, frequently changing phone numbers, illicit drug use, and prevalent comorbidities. However, by focusing on more efficient referral methods such as CHA build-ups, HCV mailings, and direct community outreach, we exceeded our goal of 200 participants.

Smoking rates among adults living in urban, minority communities are high, and this remains one of the greatest challenges to further improving asthma management among participants. Despite high rates of smoking, there is a lack of culturally appropriate, affordable, and sustainable smoking cessation services in the priority communities. In addition, many participants express a lack of motivation or perceived ability to quit smoking as they cope with other stressors such as mental illness, additional chronic diseases, and family stressors. HCWABT CHWs were not trained to provide full smoking cessation services due to time constraints and the main focus of the intervention being asthma management.

Mental illness and drug use were frequently encountered. In some cases, drug use activities prevented CHWs from completing a home visit due to safety concerns. Similar to smoking cessation services, affordable mental health and drug rehabilitation services for the poor and underserved are limited.

Those that are available often have extremely long wait times for a first consultation, a common deterrent from following through with seeking treatment. Other CHW-reported reasons for participants' unwillingness to seek support include the following: feelings of shame/stigma around mental illness and drug addiction, financial barriers, lack of social support, not having anyone to care for their belongings while in treatment, denial, competing priorities, and life stressors. If participants are unable to manage their mental illness or seek support for drug use, they have much more difficulty engaging in the CHW education and managing their asthma.

One distinguishing difference between the management of pediatric and adult asthma is the frequent presence of comorbid COPD in adults. Finding the best way to assist program participants with both diseases was challenging, as symptoms often overlap and are more severe in those with both conditions. Early in the intervention, when the high rate of COPD, diagnosed and probable, among program participants was observed, CHWs received additional training on COPD basics and tips when working with participants who have COPD. The underdiagnosis and lack of knowledge of the disease often made it challenging for CHWs to fully address asthma management. Often, participants with COPD did not have proper medications to manage their COPD, or if they did, they did not know how or when to use them correctly. In addition, CHWs reported that participants with more severe COPD often relied heavily on oxygen instead of medications, due to the difficulty in differentiating asthma from COPD and not knowing which medications to take. Furthermore, 45% of those diagnosed with COPD were current smokers, making it more challenging to manage both asthma and COPD. Last, participants with COPD often reported having considerable difficulty conducting physical activity and more frequent use of quick-relief medication.

CHWs were also faced with the ongoing challenge of economic hardship and competing priorities among many program participants. Lack of financial resources for immediate needs such as food, utilities, and housing makes it difficult to focus on managing asthma. Housing instability is common among this urban, low-income population, often resulting in their inability to complete the program. Participants prioritize money for food, rent, and bills over their health care needs. In these cases, CHWs primarily provide informal counseling and social support. After participants' immediate needs are addressed, CHWs can then fully address asthma management.

Recommendations

CHW home-based asthma interventions for adults are a concept that has just recently been realized; however, HCWABT is an example of how an existing, successful CHW intervention for children can be translated to serve the adult population. When planning to translate a CHW model to adults, it is essential to carefully consider the complexities of their needs in order to tailor recruitment methods and intervention delivery appropriately. As the intervention begins, it is imperative to continuously assess the unique needs of the population and be prepared to make changes. For example, we quickly learned that COPD, drug use, and lack of health insurance were common issues that needed to be further addressed. Thus, we added tools to assess COPD risk and COPD control, began tracking reported drug use, trained CHWs on COPD, and developed a partnership with the SHS's health insurance navigation team.

Although expensive, traditional mailings were an effective means to reaching our target population. Our partnership with CHA allowed us to send mailings to a set list of addresses that fall within the project service area. Letters to tenants within housing authority developments should clearly articulate the partnership between the program and the housing authority, so that tenants recognize CHA's support of the program. Whenever possible, it is recommended that mailings are planned in conjunction with regular mailings to tenants: an important, cost-efficient process. While far less expensive, we did not find e-mail blasts to be nearly as effective as traditional mailings in recruiting participants in our service area. We recommend that others implementing similar adult interventions focus efforts on working closely with community partners who already have relationships with and contact information for community members (e.g., local housing authority). In addition, broad and frequent program publicity throughout the community via posters, flyers, social media, and word of mouth is key. Recruitment efforts via EMR systems in the ED and outpatient clinics are useful; however, they are less fruitful due to frequently changing contact information. Such efforts might be optimized if a program liaison to the ED and outpatient clinics could be identified and used to initially connect with potential participants, including the securing of updated contact info. Overall, when participants take the initiative to self-identify as interested in the program, they are demonstrating a desire to participate that makes it more likely they will enroll and engage.

Throughout the course of the intervention, mental illness, drug use, and smoking remained some of the

biggest challenges to empowering adults to manage their asthma. With basic training, CHWs can begin to address these issues through education, motivating participants to desire to change, and assisting participants in seeking professional help whenever possible. However, without increased access to services, programs like HCWABT can only go so far in improving disease management and well-being. In addition, providing further, more intensive training for additional CHWs to provide robust smoking cessation, mental health, and/or drug addiction services, and building time for these service into the intervention model, could prove an effective methodology worth formally testing.

COPD is the third leading cause of death in the United States and a leading cause of disability (National Heart, National Heart, Lung, and Blood Institute, n.d.). Asthma-COPD overlap syndrome is challenging to treat, and evidence is still being gathered on optimal methods (Gibson & Simpson, 2009; Miravittles et al., 2013). That said, 28% of enrollees into HCWABT had this syndrome, and over half of those without a COPD diagnosis were referred for further evaluation given their COPD Population Screener results. COPD is more challenging to manage than asthma, and the overwhelming majority of those with COPD enrolled into HCWABT did not have the knowledge to control it properly. Based on our observation of these challenges, we recommend funding for initiatives that focus on COPD awareness, screening, education, and management in vulnerable communities.

► CONCLUSION

Over the past two decades, medications for asthma have improved dramatically as has knowledge regarding intervention approaches that can be used to improve outcomes. Nonetheless, the prevalence of asthma continues to rise and the burden remains high, particularly in urban, low-income communities. Most of the evidence concerning effective home-based interventions has been obtained via studies with children. HCWABT aimed to translate a tested pediatric model to adults with asthma, with the hope of narrowing the evidence gap and providing a cost-efficient, high-quality framework from which to address the rising prevalence and burden of asthma among adults living in urban, poor, minority communities. The limited number of CHW home-based asthma and HH intervention studies for adults are controlled efficacy trials, excluding patients who have been diagnosed with COPD, mental or physical disabilities, and other chronic diseases. HCWABT is an effectiveness study with minimal exclusions,

assessing the feasibility of the intervention in a real-world setting. While the study is ongoing, preliminary experiences and findings suggest that the model is feasible for use with adults. The challenges and lessons learned outlined in this article will be invaluable in effectively translating this model for adults. Outcomes from HCWABT will be published once completed, in 2017. This will allow for further dissemination of the model and recommendations for improvements in areas that may not have been successful. The lessons learned via this model can help make strides toward ultimately integrating the model into standard health care delivery, expanding the ability to improve asthma management among adults.

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