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# Effectiveness of a Community Health Worker-led Diabetes Self-management Education Program and Implications for CHW Involvement in Care Coordination Strategies

## Purpose

The purpose of this study was to evaluate the effectiveness of a Community Health Worker (CHW)-led diabetes self-management education (DSME) program and to understand how CHWs and primary care providers (PCPs) work together to provide comprehensive diabetes care.

## Methods

A quantitative pre- and postassessment of change in patients' blood glucose levels (A1C), blood pressure, and body mass index was performed to determine the clinical effectiveness of the program. Qualitative, semi-structured interviews with 5 CHWs and 7 PCPs were conducted to assess how CHWs were incorporated into clinical teams and their impact on care delivery and diabetes-related outcomes.

## Results

Patients who participated in the program experienced a statistically significant decrease in mean A1C levels and systolic blood pressure readings 1 year post baseline. CHWs provided high-quality care and bridged the gap between patients and care providers through diabetes management support and education, medication assistance, access to community resources, and social support.

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## Conclusions

CHWs play a variety of roles in helping patients overcome barriers to diabetes control and can be successfully integrated into a health care system's care coordination strategy.

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**T**ype 2 diabetes is one of the most prevalent chronic diseases in the United States, affecting approximately 24 million people.<sup>1</sup> The burden of this epidemic falls disproportionately on minorities and persons of low socioeconomic status. Hispanics with diabetes continue to experience a 50% to 100% higher burden of diabetes-related illness and death than non-Hispanics.<sup>2</sup> Common complications of diabetes include diabetic retinopathy, lower extremity amputation, and early-stage kidney disease. These complications generally can be avoided with proper management of diabetes. However, individuals of Hispanic descent are less likely to be insured, have access to primary care or disease management programs, and receive recommended processes of care.<sup>2-4</sup> As a result, Hispanics are also less likely to accomplish treatment goals such as blood glucose control.<sup>3,5</sup>

Community Health Workers (CHWs) have been deployed in multiple settings as an intervention to reduce health care disparities.<sup>6</sup> CHWs can provide a bridge between patients and clinicians by explaining concepts and answering questions, providing disease management support, facilitating patient-provider communication, and assisting with care coordination.<sup>7,8</sup> In addition to improving care for patients, CHWs can reduce the workload of other medical providers and the cost of health care delivery by supporting patient needs that do not require clinical expertise<sup>9</sup> and helping patients avoid unnecessary hospitalizations and other expensive forms of acute care.<sup>10</sup> Several randomized studies have examined the use of CHWs to provide diabetes education and management support in Hispanic populations.<sup>11-14</sup> Findings from these studies indicate that CHWs can help patients improve their knowledge about diabetes, dietary habits, medication adherence, and physical activity levels. Patients who were randomized to the CHW intervention groups achieved better glucose control<sup>11-14</sup> and had fewer emergency department visits<sup>11</sup> than patients in the control groups. While numerous studies have documented the

positive impact of CHW interventions on patient outcomes for diabetes and other chronic conditions, few studies have examined the perspectives of CHWs and primary care providers (PCPs) regarding the roles they play in helping patients achieve improved health outcomes and how CHWs can be effectively incorporated into clinic-based care teams<sup>15-17</sup>

McCloskey interviewed CHWs serving the LA VIDA program, a diabetes intervention program targeting Hispanics who have or are at risk for diabetes, to evaluate their role in reducing diabetes health disparities among patients. The CHWs reported that they helped patients overcome barriers to diabetes management by providing social, cultural, and emotional support and access to community resources. Otero-Sabogal et al assessed the extended roles of CHWs working within a primary care clinical team on patients' diabetes self-management skills and clinical outcomes.<sup>18</sup> The researchers observed improvements in patients' glycemic control, cholesterol, and self-management outcomes and conducted focus groups with providers to determine the impact of the intervention on provider satisfaction and the nature of the providers' working relationships with the CHWs. Providers reported that patients who worked with a CHW were better educated regarding disease management, medications, and devices compared to other patients and perceived that this knowledge helped patients reduce unnecessary office visits, emergency department utilization, and hospitalizations. Additionally, the providers reported that using the CHWs enabled them to see more patients.

The objective of this study was to evaluate the effectiveness of a CHW-led diabetes self-management education program (DSME) and to determine how CHWs and primary care providers work together to provide comprehensive diabetes care.

## Methods

A mixed-methods approach was used to evaluate the effects of the DSME program on patient outcomes and how the CHWs worked with PCPs to improve diabetes care. The study was approved by the Baylor Health Care System (BHCS) Institutional Review Board.

## DSME Program

BHCS implemented the Diabetes Equity Project (DEP), a CHW-led DSME for uninsured and underserved

patients, with funding from a Merck Company Foundation grant. The DEP is a unique partnership between a private, not-for-profit health care system and 5 community clinics designed to reduce disparities in diabetes care and improve outcomes in the predominantly Hispanic communities surrounding BHCS hospitals.<sup>19</sup> The program features specially trained, bilingual CHWs who deliver a culturally relevant diabetes education curriculum targeting barriers to diabetes management that Hispanics commonly experience, including lack of knowledge about diabetes, lack of social support, poor diets, insufficient physical activity, and limited access to care. The CHWs are embedded in the clinics and work directly with clinicians as part of the care team.

The DEP program consists of two initial 60-minute educational sessions and quarterly clinical assessments scheduled for 30 to 60 minutes for a maximum of 6 patient contact hours over 12 consecutive months. The DSME curriculum for DEP was adapted from CoDE™, a pilot program implemented in a Dallas clinic serving a largely uninsured Mexican American population.<sup>20</sup> Patients who participated in CoDE for 12 months experienced a significant reduction in A1C.<sup>20,21</sup> During the 2 educational sessions, the CHWs educate DEP participants about diabetes and the importance of blood glucose control, medication adherence, diet, and exercise. In addition to the educational sessions, CHWs perform quarterly clinical assessments of A1C, blood pressure, weight, and foot condition (visual and monofilament assessment). They also assess self-management behaviors and facilitate goal setting at each visit. The CHWs document patient visits in the electronic health record and contact the patient's PCP immediately if the patient is symptomatic or has critical blood glucose or blood pressure measurements as defined by program protocol.

### Sample/Setting

The DEP was implemented in 5 community clinics in the Dallas, Texas, metropolitan area. Clinics were selected to participate based on geographic location, size of patient panel, number of uninsured Hispanic patients, and ability to provide supporting clinical services. Patients were referred to the DEP by providers at the clinics and by clinicians at BHCS facilities following emergency room visits and hospitalizations related to uncontrolled diabetes. To participate in the DEP, patients had to be 18 years of age or older with a diagnosis of type

2 diabetes and be uninsured or underinsured. While the program targeted Hispanic patients, all patients who met the inclusion criteria were eligible to participate regardless of ethnicity or race.

### Outcome Measures

The CHWs recorded patient clinical indicators during quarterly examinations in an electronic diabetes registry. Key indicators including mean blood glucose (A1C), body mass index (BMI), and systolic and diastolic blood pressure were monitored monthly by DEP leadership, clinicians, and CHWs to assess the overall clinical effectiveness of the DEP and identify areas for improvement. These indicators are commonly used to assess the impact of DSME programs on patient health. The researchers conducted a preliminary analysis to determine the impact of the DEP program on clinical indicators of participants who enrolled during the first 18 months of the program and who had at least 2 visits with a CHW. *T*-tests were used to compare clinical indicators obtained at baseline to indicators obtained from patients' last recorded visit with the CHW. Statistical analyses were performed in SAS.

### Qualitative Approach to Evaluating DSME

Semi-structured in-person interviews were conducted with all 5 DEP CHWs and with 7 of the PCPs (6 physicians and 1 nurse practitioner) who worked with the CHWs in the community clinics. The CHWs and PCPs were recruited by the DEP program director. The sample included at least 1 PCP from each of the 5 DEP sites. CHW interviews took place in October of 2011. PCPs were interviewed in June-July of 2012.

Interviews were conducted using open-ended interview guides. The CHW interview guide contained 20 questions regarding CHW roles and responsibilities in the delivery of the DEP intervention, CHW training, and the role of the CHW within a health care system's care coordination strategy. For example, CHWs were asked to describe the types of services they provided to patients and how they helped patients overcome barriers to diabetes management. In addition, CHWs were asked to describe their role in the patient care team and their working relationships with the physicians and clinic staff. Similarly, the PCP interview guide contained 17 questions regarding the role CHWs play in improving diabetes-related outcomes for patients, how CHWs function within

Table 1

## Demographics and Clinical Outcomes of Patients Who Enrolled in the Diabetes Equity Project

Baseline Characteristics	(n = 497)		
Gender			
Male	40%		
Female	60%		
Age (years)			
Missing	1%		
<30	6%		
30-39	15%		
40-49	15%		
50-59	32%		
≥60	14%		
Ethnicity			
Hispanic	70%		
Non-Hispanic	30%		
<b>Clinical measures (mean)</b>	<b>Baseline</b>	<b>1-Year Follow-up</b>	<b>Significance</b>
A1C (%)	8.7	7.4	<.00
Body mass index (kg/m <sup>2</sup> )	32.9	33.0	.77
Diastolic blood pressure (mmHg)	79.3	78.2	.13
Systolic blood pressure (mmHg)	129.8	127.3	.03

a health care system's care coordination strategy, and opportunities for enhancing the effectiveness of the CHW role. PCPs were asked to describe how they interacted with the CHWs on a daily basis, how patients responded to the CHWs, and the impact of CHWs on care delivery.

The CHW and PCP interviews lasted approximately 30 to 45 minutes. CHW responses were transcribed verbatim. PCP interviews were recorded using a digital voice recorder and transcribed. The researchers used thematic content analysis to analyze the contents of the interviews. Two researchers coded interview transcripts using preset and emerging codes to identify underlying themes. Preset codes were based on findings from the literature regarding roles of CHWs in chronic disease management. Emerging codes were used to capture new topics in the data. The researchers grouped the responses from CHWs and PCPs by codes to identify frequency and patterns of responses and reoccurring themes.

## Results

The DEP enrolled 806 patients during the first 18 months of the program (September 2009–March 2011). The majority of patients were female (60%), between 40

and 59 years of age (64%), and Hispanic (70%) (Table 1). Participants took an average of 1.1 years to complete the program curriculum, and an attrition rate of 15% was calculated for the first 18 months. Patients who attended at least 2 visits with the CHWs experienced statistically significant improvements in glucose control and systolic blood pressure. The mean A1C value for patients was 8.7% at baseline and improved to 7.4% following participation in the DEP. No statistically significant differences in body mass index or diastolic blood pressure were observed.

### DEP CHW Roles and Responsibilities in Patient Care

The CHWs reported that they have multiple roles and responsibilities in providing patient care, including providing patients with diabetes management services and educating them about diabetes and the importance of good nutrition, exercise, and medication adherence. As one CHW explained, "I educate patients. Help them manage their care. Help them to know how to manage their diabetes when they go home. I try to figure out the barriers they face." One PCP described the CHW's role as a "coach" to patients. "She will help coach them in ways that they can make changes in their diet and exercise

habits. She can teach them how to understand diabetes better and functions of the medicines.” The majority of the PCPs agreed that the most important role of the CHW is to educate the patients about diabetes and diabetes management as providers do not have adequate time or resources for diabetes education. A PCP explained, “We can brush through some basic things in a couple of minutes as far as diabetes education, but our [CHW] actually sits down with the patients. She has examples of meals. She has things they can visualize and touch. They can put meals together and place items on the plate.”

The CHWs and PCPs reported that many of the DEP patients have financial and social needs that make diabetes management difficult, if not impossible. All of the CHWs mentioned that a key component of their role is connecting patients to community resources to help meet their needs. “I help them find resources in the community such as food pantries and exercise places. I help them find places where they can get medicines for cheap or free.” The PCPs said the CHWs provided patients with practical ways to improve diabetes management. One example mentioned by a CHW was teaching patients how to buy healthy foods on a budget. Three providers stated that access to medications was the biggest barrier to diabetes management for their patients. CHWs work with clinic staff to provide patients with sample medications or connect them with medication assistance programs and safety net pharmacy programs.

CHWs reported that they serve as a bridge between the patients and the physicians. As one CHW stated, “The patients call me if they have questions about the next appointment, labs, or how to take their medicines. They [physicians] ask me to explain to the patient about things such as medicine and insulin.” In this capacity, the CHWs help patients with questions about appointments, labs, and medications.

### Effectiveness of the DEP

The CHWs and PCPs reported that they observed improved adherence to lifestyle modifications and outcomes such as improved A1C and weight control in DEP patients. A PCP commented,

Across the board, A1C is going down, patients are losing weight, patients are exercising, [and have] healthier lifestyles. . . . Patients feel empowered because now they know how to implement the things we’re recommending into their life from the standpoint of where

they are at that point. A lot of times, when we [clinicians] present that information, it’s pie in the sky kind of thing, and they don’t know how they can make it happen for them.

The CHWs indicated that the key to the DEP’s success is the ability to establish trust with the patients, which makes patients more receptive to diabetes education and improves compliance with treatment. A CHW explained, “You have to build that trust. A lot of it is showing them compassion and that you are interested in their health and in getting to know them better.” The PCPs agreed that the CHWs’ ability to build trust with patients is crucial to engaging these patients in the care process and that the CHWs can build better rapport with patients because they are seen as peers and understand cultural barriers to diabetes management.

The CHW is from the community, so what she says holds more weight. Especially with what to eat, how to diet, how to exercise. [The CHW] may understand better where the patients are coming from and what some of the common myths [concerning diabetes] are and be able to challenge them in a way that the doctor in the white coat is not going to be able to challenge them.

Several PCPs noted that the trusting relationship between the CHWs and the patients allows the CHWs to act as their “eyes” and alert the provider to specific barriers individual patient face regarding diabetes management.

With [the CHW], they’ll be a lot more honest and tell her things they won’t tell me. It could be anything—they can’t afford medications or struggling with family because they’re eating different foods . . . I would describe her as my “eyes and ears,” she alerts me to a lot of things going on that I don’t know about or pick up on.

The providers also cited the CHW’s ability to spend additional time with patients, take care of needed services that PCPs don’t have time for, and hold patients accountable as the driver of improved outcomes. One PCP commented, “[The CHW] takes a lot off of our hands. She is able to spend a lot more time on those areas that necessitate a lot of time and education from the patient standpoint that in no way would be efficient for the physician to handle in depth.” Another PCP emphasized the importance of the CHW’s ability to educate patients on how to manage diabetes on a daily basis.

“You’re not going to have a well-controlled diabetic that continues to eat poorly. The medicine’s not magic. They only see us every 3 to 4 months, so day-to-day the decisions they are making are more important once they leave the clinic. Helping with that is really important.” PCPs also reported that the CHWs’ ability to explain diabetes and diabetes management in terms patients can understand also enhances the effectiveness of the DEP. “She’s able to explain things in more simple or elementary terms, which is actually more helpful. Some of us as physicians struggle with that because we make a lot of assumptions about what people understand. So she’s probably more effective at that with our patients.”

### **CHW Roles in a Care Coordination Strategy**

The CHWs said they felt comfortable interacting with PCPs as part of a care coordination team and worked with providers to provide patients with high-quality care. They explained that they know the scope of their role and when they should alert PCPs to potential patient problems. As one CHW explained, “If I have patients with high blood sugar or blood pressure, I go to the doctor. The doctor decides if the patient needs an appointment or if he needs to send the nurse to give insulin.” PCPs felt that it was important for CHWs to recognize clinical boundaries and to know when to ask the provider for help. The CHWs indicated that the PCPs value them and often request their help with patients. “He [the physician] always asks me for reports or to help him with things.” Likewise, the PCPs reported that they were comfortable working with CHWs and that having the CHWs as part of the care team improved the quality of patient care. One PCP reported, “I’ve been very comfortable with CHWs, I love them, I think they are extraordinarily effective. [The CHW] is comfortable coming to me and vice versa when there’s something in my area versus her area. We are collaborators.” Another PCP agreed: “[The CHW] is an integral part of our team, and we are a primary care practice and PCMH. She has enhanced the care we give to our patients. I only see that as a good thing.” Both CHWs and PCPs acknowledged that it took time to develop comfortable working relationships and that observed improvements in patient outcomes helped foster acceptance of the CHW role in primary care clinical teams.

When asked about the possibility of expanding the DEP model, the CHWs and PCPs agreed that care coordination teams using CHWs would be beneficial in other

settings and for other conditions. Several PCPs suggested that incorporating a CHW as part of a care delivery model with a focus on disease management would be valuable for other conditions such as asthma, hypertension, coronary artery disease, congestive heart failure, and depression. Several providers thought the model would work in a fee-for-service environment and that it would be particularly valuable as practices transition to population-based models of care delivery. PCPs noted that patients who are treated in private practice also need help with disease management and navigating the health system. Other PCPs said using CHWs to deliver education and disease management would allow physicians to see more patients. One provider explained that as more people become insured, physicians will not be able to keep up with the growing demand for care unless some elements of care are handled by other members of the care team.

The providers agreed that there could be many barriers to implementing a model such as the DEP, especially in a fee-for-service setting. Cost, lack of a reimbursement mechanism, and physician acceptance were the most commonly cited barriers to adoption. One PCP explained, “The limitation would be that people want to know how that will bring money to the practice. That’s the bottom line. Is it a billable service? Is insurance going to pay for it?” Providers also indicated that physicians may be reluctant to give certain responsibilities to a CHW if they can bill for the same services at a higher rate.

### **Discussion**

The DEP represents a new model of care featuring CHWs as part of an integrated primary care team with an emphasis on diabetes management. These findings indicate that the model is an effective way to help patients achieve improved diabetes control. CHWs played many roles in the delivery of patient care and their services were of value to the PCPs. Over time, the CHWs and PCPs developed a collaborative working relationship and a team approach to care that enabled patients to receive comprehensive, coordinated clinical care and social support needed to overcome barriers to diabetes management and overall health. The providers indicated that primary care coordination models utilizing CHWs could be used to help patients with other chronic conditions that require the patient to engage in disease management activities. Some providers also indicated that integrating

CHWs into primary care teams would allow them to provide better care to patients and expand their panel size.

Patients who enrolled during the first 18 months of the DEP demonstrated statistically significant improvement in A1C, the primary outcome measure. Mean A1C decreased from 8.7% to 7.4%. A 1.3% average reduction in A1C can greatly improve a patient's overall health and increase length and quality of life. The United Kingdom Prospective Diabetes Study Group found that every 1% reduction in A1C reduces a patient's risk of developing eye, kidney, and nerve disease by 40% and the risk of heart attack by 14%.<sup>22</sup> While blood glucose was the primary measure of interest, DEP patients also demonstrated statistically significant improvements in systolic blood pressure. Patients experienced a slight, nonsignificant reduction in diastolic blood pressure and were able to avoid an increase in BMI.

PCPs gave many explanations as to how the CHWs helped DEP patients achieve improved glucose control. The majority of the providers recognized that they did not have sufficient time to provide proper education regarding diabetes management and that the most important role of the CHWs was to fill this gap. They also indicated that CHWs have better resources, such as visual aids, that enable them to be better teachers. Similar to findings reported in other CHW studies, the providers indicated that most patients viewed the CHW as a trusted peer instead of another "white coat" and were more receptive to their teachings and more willing to comply with suggested lifestyle changes. The providers also recognized that CHWs could better address cultural barriers to diabetes management and were able to break down the concept of diabetes management into smaller, more realistic goals for patients.

Several studies have reported that CHWs can serve as a "bridge" between patients and providers, and many of the CHWs indicated that this is the case in the DEP. Unlike many CHW programs, the DEP incorporates CHWs as members of primary care teams, and CHWs and physicians work together to help patients meet their various clinical and social needs. Working in this capacity, CHWs can act as an extra set of eyes and hands for the PCPs. Patients often tell the CHWs things that they do not tell physicians and reveal their underlying barrier(s) to diabetes management. The CHW and PCP can then work together to help the patient overcome the barrier(s). The CHWs also take some of the load off PCPs by providing basic clinical support, answering patient questions, and providing regular follow-up with patients.

This study has several limitations. It is an observational study, and there is not a control group. Changes in the primary outcome of interest may have been due to other social, temporal, or environmental factors rather than the intervention. However, observed changes in A1C were consistent across 5 clinics located in different areas of Dallas, indicating that the observed effects may be at least partially attributable to the intervention. The quantitative analysis only includes patients who enrolled in the DEP during the first 18 months of the program. Informants may have been biased as to the success of the program or hesitant to reveal true feelings about the DEP as they knew that their responses would be reported. Although participants were assured their identity would not be directly associated with their responses, the small number of CHWs and providers limits anonymity.

## Conclusion

The use of primary care teams that include physician extenders such as CHWs can be an effective care coordination strategy and will be necessary to provide high-quality care to more patients under proposed population health models. Although the DEP intervention was limited to 5 community clinics that serve vulnerable, predominantly Hispanic populations, many of the PCPs indicated that this model could work in other primary care settings including fee-for-service clinics. The clinics served by the DEP are certified PCMHs, and the DEP model could facilitate the transition of other primary care practices to PCMHs. While most patients do not need the intense level of disease management provided by the DEP, many patients need some assistance in adhering to disease management plans, making lifestyle changes, and navigating the health system. Most of the DEP providers agreed that working with the CHWs made the delivery of care more efficient. However, there are many barriers to implementing this model including cost, lack of reimbursement for CHW services, and physician acceptance. Further research is needed to determine the effectiveness of this model outside the community clinic setting.

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