Home Visits Do Make a Difference: Results from an African American Diabetic Pilot Intervention Utilizing Community Health Workers in the Mississippi Delta

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Abstract

In a pilot study, researchers assessed whether home visits by volunteer community health workers (CHWs) would enhance health behaviors (testing glucose) and reduce health indicators (glucose levels, BMI, blood pressure, and waist circumference) among African American Care Transition patients as one clinical intervention of the BLUES (Better Lives Utilizing Electronic Systems) Beacon community project in the Mississippi Delta. The results show CHW visits enhanced diabetic patients’ self-monitoring and efficacy in glucose testing. The findings of this study have implications for the appropriate use of CHWs as informed educators to promote diabetic patients’ treatment plans.

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Acknowledgements: Funding for this research was provided by the Delta Health Alliance (DHA), a 501©3 non-profit organization and by the Office of the National Coordinator for Health Information Technology, grant #90BC004/01, 04/01/10–08/30/13.

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Keywords: home visits, community health workers, diabetes, chronic diseases, care transition programs, Mississippi Delta

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Barriers to optimal diabetes management are complex. Biological risk factors, like obesity and lack of adequate physical activity, interact with social, historical, economic, educational, environmental, and cultural factors to compound this complicated chronic disease. The care practices to enhance glucose control, reduce cardiovascular risk factors and other comorbid diseases, reduce admission or readmission to hospitals, and detect complications early and in treatable stages can prevent or delay costs and decrease morbidity and mortality (The Diabetes Control and Complications Trial Research Group, 1993). However, many persons with diabetes do not receive the recommended preventative services or achieve optimal glycemic control (Harris, Eastman, Cowie, Flegal, & Eberhardt, 1999; Saaddine, Engelgau, Beckles, Gregg, Thompson, & Narayan, 2002). While diabetes self-management education is considered to be an integral component to diabetes self-care (American Diabetes Association, 2005), many people do not receive culturally appropriate self-management instructions or interventions that are effective (Norris, Lau, Smith, Schmid, & Englegau, 2002).

A major obstacle to optimal care is the lack of access to high quality, culturally appropriate preventative health care (Institutes of Medicine, 2002). For persons with diabetes or those at risk for diabetes, lack of health insurance exacerbates an already precarious state. Even with access to healthcare, there may be individual, community, or systemic level barriers to receiving adequate self-care. For instance, ethnic and racial minorities experience disproportionate disease burdens and complications thus interventions that effectively promote health among these groups are particularly important (Heisler, Faul, Hayward, et. al., 2007; Ruggiero, Castillo, Quinn, Hochwert, 2012).

There is a growing body of evidence supporting the role of community health workers (CHWs) in diabetes care with studies demonstrating improved knowledge about diabetes, self-monitoring, self-care, and lifestyle changes, as compared with control groups or patients’ baseline characteristics, depending on the study (Babamoto et al., 2009; Katula et al., 2011; Norris, et al., 2006; Shah, Kaselitz, & Heisler, 2013; Spencer et al., 2011; Thompson, Horton, & Flores, 2007). Research demonstrates CHW interventions as appropriate and promising strategies for improving diabetes outcomes (Shah, Kaselitz, & Heisler, 2013). As community members, CHWs are able to integrate health information about prevention of disease and the health delivery system into the community’s culture, language, and value systems to help to reduce barriers to health care. Such interventions address individual level factors as well as
community and systemic level factors. For instance, CHWs increase access to care and facilitate appropriate use of health resources by providing outreach and cultural linkages between communities and health systems. They also help reduce costs by providing health education, screening, detection, and basic emergency care as well as improve quality of care by contributing to patient-provider communication (Witmer, Seifer, Finocchio, Leslie, & O’Neil, 1995).

Care Transitions Program

Researchers implemented a pilot study that assessed the effectiveness of CHW home visits on enhancing African American diabetic patient self-monitoring and reducing key health indicators. Participants were care transition patients in the Mississippi Delta and were involved with the BLUES (Better Lives Utilizing Electronic Systems) Beacon community project. Section 3026 of the Patient Protection Affordable Care Act (PPACA) designed the Community-based Care Transitions Program (CCTP) to test models that improve care transitions from hospitals to other settings and reduce readmissions for high-risk Medicare beneficiaries. While the CCTP’s immediate goals are improving transitions of beneficiaries from inpatient hospital settings to other care settings, other high priority goals are improving the quality of care, reducing readmissions for high risk beneficiaries, and documenting measurable savings. Approximately 2.6 million seniors (one in five Medicare patients) are readmitted to hospitals within 30 days at a yearly cost of over $26 billion (Center for Medicare and Medicaid, 2013). The care transitions intervention programs associated with the Mississippi Delta hospitals are 45-day coaching programs for patients with primary diagnoses of diabetes, chronic heart failure, chronic obstructive pulmonary disease, and pneumonia. The care transition coaches aimed to reduce the amount of re-admission rates for diabetic, chronic heart failure, chronic obstructive pulmonary disease, and pneumonia patients at various Mississippi Delta hospitals. An addition to the care transition project was the CHW diabetic demonstration project where recruited volunteer CHWs provided home visits to patients discharged from care transition coaches. Specifically, this pilot study examined whether home visits by volunteer CHWs would enhance health behaviors (testing glucose) and reduce health indicators (glucose levels, BMI, blood pressure, and waist circumference).

BLUES Beacon Community

The BLUES Beacon community is one of 17 sites nationwide dedicated to advancing the adoption of electronic health records (EHRs) and expanding connections through health information exchange (HIE). The program also seeks to increase the efficiency of health care in the area by reducing excess health care costs for patients with diabetes through the use of related interventions. The purpose of these interventions is to 1) encourage the use of best practices for the management of diabetes and related conditions; 2) reduce preventable hospital stays due to diabetes; and 3) provide more accurate billing information (Delta Health Alliance, 2013). Both the care transition program and the CHW diabetic demonstration project are among the seven related clinical interventions piloted in the BLUES Beacon community, in addition to other technological interventions (K. Massey, personal communication, April 23, 2013).

Methods
Referrals were individuals from the Mississippi Delta area care transition programs. Hospitals in Cleveland (Bolivar County Medical Center), Clarksdale (Northwest Regional Medical Center), Greenwood (Greenwood-Leflore Hospital), and Indianola (South Sunflower County Hospital) admitted these individuals for diabetic complications within the past 45 days. CHWs contacted the referred diabetic patient utilizing a phone script and inquired if the patient was interested in home visits entailing glucose, blood pressure, and BMI measurements and further diabetes education. The CHW also explained that the home visit would be part of a research project and obtained informed consent at the beginning of the home visit. Volunteer CHWs utilized in this pilot program were trained according to the GOTCHA (Getting On Target with Community Health Advisors) curriculum (Mayfield-Johnson, 2011; Story, Mayfield-Johnson, Downey, Anderson-Lewis, & Young, 2010) to provide health information related to diabetes.

At the first home visit, CHWs explained the research component of the project and obtained informed consent. They also administered a baseline demographic data questionnaire and provided a 10-15 minute health education session on diabetes to the patient. Health education sessions included information regarding a diabetes overview, symptoms, misconceptions, how to perform home glucose testing, optimal glucose numbers, understanding carbohydrates, and relationship to other chronic diseases. The CHW performed a glucose test, a blood pressure reading, and assessed BMI through height, weight (with a Tanita scale), and waist circumference. Other miscellaneous questions concerning the referred diabetic’s disease status (medications, self-monitoring status, where they obtained their testing strips, payment concerns, etc.) were also recorded. CHWs provided information on available community diabetes education programs, specifically Team Sugar Free, a diabetic self-management class.

During home visits 2-4, CHWs repeated all activities except administering the demographic questionnaire. A total of 30 African American diabetic men and women participated in the pilot program, each receiving four home visits, for 120 home visits within a four-week period. Participants were from Coahoma, Bolivar, Humphreys, Leflore, Sunflower, and Washington counties in Mississippi.

Results

The purpose of the pilot study was to determine the effectiveness of CHW home visits in enhancing health behaviors (testing glucose) and reducing health indicators (glucose levels, BMI, blood pressure, and waist circumference). The pilot study included self-reported data from a sample of 30 African American participants across four different time points. The study’s duration was four weeks with even distribution of time points. The gender composition of the sample was 60% males and 40% females. The age of participants ranged from 39 to 78 years with the average age being 57.13 ± 8.68 years. In regards to education, obtaining a GED/high school diploma was the most common educational level reported by participants with 33% of the sample earning a community college degree and 6.7% having a Master’s degree or higher. In addition, approximately 55.2% of the sample reported being employed during the course of the study with 50% of those employed participants reporting full time employment. The median household income was $800-$1200/month with only 7% of the sample reporting higher values.
In regards to health related characteristics, all participants reported having some type of medical insurance. In regards to health status, 96.7% of the participants reported Type II diabetes and 43.3% reported high blood pressure (i.e., 140/90 or greater). At the beginning of the study, 73.3% of the participants reported taking medication as compared to 80% by the time the study ended. The large majority of these medications were for Type II diabetes (e.g., Metformin). At time 1, 86.7% of the participants reported knowing how to test their glucose with an increase to 96.7% of the participants at the end of the study. The majority of participants (93.3%) reported getting glucose test strips through their insurance provider with the remaining participants (6.7%) reporting their doctor or veterans program providing them test strips. Only a marginal 3.3% of the participants reported having difficulty obtaining the test strips.

A Spearman rho correlation coefficient for the relationship between participants’ age and education level and again for education level and household income shows a moderate negative correlation ($\rho(27) = -0.478$, $p < .01$), indicating a significant relationship between age and education level such that younger participants tend to have higher levels of educational attainment. A moderate positive correlation was found ($\rho_{28} = 0.485$, $p < .01$) for the education level and household income. Higher levels of education relates to higher levels of reported household income.

**Health indicators over time**

To determine if there is a relationship between number of home visitations and how often participants test their glucose, researchers conducted a one way repeated measures ANOVA where the number of home visitations was the independent variable and how often participants test their glucose the dependent variable. Table 1 presents the means and standard deviations for how often participants test their glucose with values ranging from one (when you remember) to five (more than 2 times a day). The results of the ANOVA indicated a significant time effect (Wilks’ $\Lambda = 0.45$, $F(3, 25) = 10.14$, $p < .001$, multivariate $\eta^2 = 0.55$).

<table>
<thead>
<tr>
<th>Number of home visitations</th>
<th>$M$</th>
<th>$SD$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2.75</td>
<td>1.35</td>
</tr>
<tr>
<td>2</td>
<td>3.36</td>
<td>1.1</td>
</tr>
<tr>
<td>3</td>
<td>3.64</td>
<td>0.91</td>
</tr>
<tr>
<td>4</td>
<td>3.71</td>
<td>0.85</td>
</tr>
</tbody>
</table>

Follow-up polynomial contrasts indicated a significant linear effect with means increasing over time indicating that participants tested their glucose more frequently as the number of home visits increased ($F_{(1, 27)} = 1.89$, $p < .001$, multivariate $\eta^2 = 0.42$). There was also a significant quadratic effect that suggests that frequency of testing glucose was the lowest at the first home visit and highest at the fourth home visit, while frequency of testing at home visit 3...
and 4 was moderate and did not change across this intermediate time period ($t(1, 27) = 8.05, p < .01, \text{ multivariate } \eta^2 = .23$). Figure 1 displays the quadratic effect. This may suggest that participants who were testing their glucose daily are likely to increase the frequency of testing to twice a day, however there may be a leveling effect where the testing more often than twice a day is no longer related to the increase in home visits. This seems reasonable as the frequency of testing in a day has a limit whereas the number of home visits may not.

![Figure 1. Home visits and estimated frequency of testing glucose.](image)

To assess if there is a relationship between number of home visitations and glucose levels, a one way repeated measures ANOVA was conducted using number of home visitations as the independent variable and glucose levels as the dependent variable. The results of the ANOVA indicated a non-significant time effect (Wilks’s $\Lambda = .76, F(3, 27) = 2.9, p = .053$, multivariate $\eta^2 = .24$). Analyzing the relationship between number of home visitations and BMI, a one way repeated measures ANOVA, where the independent variable is number of home visitations and the dependent variable BMI, revealed a non-significant time effect (Wilks’s $\Lambda = .924, F(2, 28) = 1.15, p = .331$, multivariate $\eta^2 = .08$). Another one way repeated measures ANOVA tested the relationship between number of home visitations, the independent variable, and waist circumference, the dependent variable. The results of the ANOVA also showed a non-significant time effect (Wilks’s $\Lambda = .93, F(2, 28) = 1.0, p = .381$, multivariate $\eta^2 = .07$).

In relation to blood pressure, a one way repeated measures ANOVA was conducted on number of home visitations and blood pressure (systolic). The results of the ANOVA indicated a non-significant time effect, Wilks’s $\Lambda = .81, F(3, 26) = 2.01, p = .137$, multivariate $\eta^2 = .19$. However, a one way repeated measures ANOVA on home visitations and blood pressure (diastolic) yielded a significant time effect, Wilks’s $\Lambda = .71, F(3, 26) = 3.47, p < .05$, multivariate $\eta^2 = .29$. Table 2 presents the means and standard deviations for blood pressure (diastolic).

Table 2
### Means and Standard Deviations for Blood Pressure (diastolic)

<table>
<thead>
<tr>
<th>Number of home visitations</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>81.28</td>
<td>10.7</td>
</tr>
<tr>
<td>2</td>
<td>78.83</td>
<td>14.09</td>
</tr>
<tr>
<td>3</td>
<td>80.34</td>
<td>10.41</td>
</tr>
<tr>
<td>4</td>
<td>79.48</td>
<td>9.88</td>
</tr>
</tbody>
</table>

Follow-up polynomial contrasts indicated a non-significant linear effect, $F_{(1, 28)} = 2.1$, $p = .152$, multivariate $\eta^2 = .07$. Higher order polynomial contrasts were non-significant. There was a decrease in diastolic blood pressure from home visit 1 to 2, an increase from home visit 2 to 3, and a decrease from home visit 3 to 4, however, these changes were in opposing directions. While the results, in Figure 2, of the repeated measures ANOVA are significant, further investigation indicates a lack of practical significance that would provide meaningful conclusions regarding the effect of the number of home visits on diastolic blood pressure.

![Figure 2. Home visits and diastolic blood pressure.](image)

**Discussion**

The findings of this pilot study describe the effectiveness of home visits by volunteer CHWs with increasing African American diabetic patient self-monitoring. As CHWs are able to provide patient care, education, and social support, participants were able to practice correct and effective self-monitoring while understanding the importance of monitoring their glucose. Results demonstrated that participants tested their glucose more frequently as the number of home visits increased. Many respondents went from testing “when I can remember” and “not every day” to “twice a day” or more. A positive behavior change in frequency of glucose testing
is necessary for managing one’s diabetic treatment plan and preventing long-term complications, especially for individuals who have already had inpatient services at a local hospital for diabetes.

Participants also reported increased efficacy with performing glucose tests correctly as home visits increased. Several respondents did not know what type of medication their doctors had prescribed at Time 1, but as visits with CHWs increased, participants became aware of their medications from discussions during the following home visits. CHWs also reported spending time with participants discussing prescription assistance programs, local (to participants’ homes) clinic services, and other referral services (i.e. assistance with electricity, food banks, and transportation services).

This pilot study did not demonstrate the effectiveness of CHW home visits with changes in health indicators (blood pressure (systolic), glucose levels, BMI). The main limitation of this pilot study was that patients were not assessed for a longer period. The 4-week data collection period did not allow for impact measures to be adequately assessed as changes in glucose, blood pressure readings, A1C, and BMI are slow to develop and necessitate multiple measurements over longer periods of time to adequately document legitimate changes.

Participation in diabetes community education classes could not be effectively measured due to the changes in the time of the pilot study. Initially, the plan was to coordinate with diabetes education classes at times and in locations where participants could attend. Changes to the time for the pilot study did not allow for the coordinated effort.

**Conclusion**

CHWs typically work in their own communities, share cultural, economic, linguistic, and other characteristics with the patients they work with and are able to build a close, trusting relationship with communities because of a deep knowledge of that community (American Public Health Association, 2013). They can serve as a vital link between health services and the community because of their unique knowledge, cultural competency, and close relationship with the community. CHWs serve in a variety of capacities, typically focusing on strategies to improve diabetes self-management with five primary roles identified. These roles include patient care, education, support for care delivery by other health professionals, care coordination, and social support (Norris, et al., 2006).

Our analysis revealed that having CHWs conduct home visits with African American diabetic patients who have been discharged from a care transition program does significantly increase health behaviors such as self-monitoring of glucose levels. Preliminary findings suggest that full implementation of the complete study with appropriately allotted time, opportunities for coordination of community diabetes education classes, and follow-up measurements could improve the quality of many African American diabetics’ treatment plans and prevention of long-term complications.
References


