**Utilization of Spanish Medical Interpreters for Diabetes Education in a Community Health Center**

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**Executive Summary Draft**

**Problem Statement and Significance**

The burden of diabetes is disproportionately higher among the Hispanic population in the U.S., as more than 12.5 % are diagnosed with diabetes compared to 7.5% of non-Hispanic whites (Center for Disease Control and Prevention [CDC], 2020; U.S. Census Bureau, 2019). In addition to being at greater risk for developing diabetes type 2, Hispanics are also more likely to develop diabetes type 2 at a younger age and more likely to experience complications from diabetes when compared to non-Hispanic whites (CDC, 2020). Social determinants of health (SDOH), such as lower than average incomes and high uninsured rates, adversely impacting their ability to access and afford primary health care services (U.S. Census Bureau, 2018). Aside from having genetic, environmental, socioeconomic, and lifestyle risk factors for diabetes, many Hispanics living in the U.S. encounter language barriers and lack access to culturally sensitive diabetes education (Aguayo-Mazzucato et al., 2019). The language barrier and lack of culturally sensitive education often prevent individuals from asking questions, understanding medical instructions or educational materials, and establishing relationships with health care providers.

Recent evidence-based approaches aimed to reduce these health disparities include the use of Community Health Workers (CHWs) or *promotores* (the Spanish word for health promoters). The American Diabetes Association (ADA, 2021) advocates for the use of CHWs in cost-effective, patient-centered strategies to improve outcomes and reduce risks of diabetes in underserved communities. Utilization of CHWs for diabetes education is vital to disseminating diabetes self-management education and support (DSMES) to the community, as there is estimated to be only one diabetes educator for at least 1000 people living with diabetes in the U.S. (American Association of Diabetes Educators [AADE], 2017). Based on a review of literature conducted in September 2020, CHWs can be instrumental in improving diabetes outcomes among Hispanic adults in the United States (Aponte et al., 2017; Carrasquillo et al., 2017; Hughes et al., 2016; Kane et al., 2016; Perez-Escamilla et al., 2015; Spencer et al., 2018). Besides lowering hemoglobin A1C (HbA1C), CHW-led diabetes programs were also found to improve diabetes knowledge (Aponte et al., 2017; Kane et al., 2016), blood pressure (Kane et al., 2016), fasting glucose (Perez-Escamilla et al., 2015), quality of life scores (Kane et al., 2016), and diabetes distress and depression scores (Hughes et al., 2016; Spencer et al., 2018). The CHWs in these studies were extensively trained, between 90-160 hours, and they led intensive diabetes education programs, including house visits, phone calls, or meetings at a clinic. Sustainability after the intervention ended (Aponte et al., 2017; Carrasquillo et al., 2017) and reimbursement were the most common concerns mentioned in these studies (Kane et al., 2016; Spencer et al., 2018). There was no evidence in the research that discussed the possibility of providing low-intensity training of diabetes to current Spanish medical interpreters in a public health or clinic setting.

In June 2020, Riggs Community Health Center (CHC) developed a Diabetes Care Management (DCM) program to provide greater assistance and support to their patients with uncontrolled diabetes. At the time, about 500 of their established patients had uncontrolled diabetes with HbA1C greater than or equal to 8.0%. Since there is no bilingual nurse at Riggs CHC, 159 of those Spanish-speaking patients were not initially included in the DCM program. The purpose of this DNP project was to train the Spanish-medical interpreters employed by Riggs CHC in the basics of diabetes management to be utilized as modified CHWs or *promotores*. A secondary aim was to analyze the preliminary effects on the HbA1C of the contacted patients once they had been included in the DCM program.

**Methodology**

***Phase 1: Training of the Interpreters to be Promotores***

**Sample and Design***.* Following institutional review board (IRB) approval, the interpreters at Riggs CHC received three-one-hour training sessions provided by this DNP project author, a bilingual registered nurse. Each interpreter provided consent to attend the educational training, and each completed a diabetes knowledge pre-and post-test. The interpreters each received a collection of reference material in English and Spanish from the ADA patient education library and the AADE7 Self-Care Behaviors webpage. The training sessions reviewed the basics of diabetes, including signs of high and low blood sugar, the importance of medication adherence, complications of uncontrolled diabetes, and how lifestyle interventions such as diet and exercise can impact diabetes. Cultural considerations of the Hispanic population and the basics of goal setting were also included. The interpreters were instructed on their role within the diabetes management program at the clinic and how to address patient concerns about diabetes that are beyond the scope of the training. The DCM policy was amended to incorporate the interpreters and discuss their role within the program.

**Measures and Data Analysis Strategy***.* The Michigan Diabetes Research and Training Center’s Revised Diabetes Knowledge Test (DKT2) was selected to measure the interpreters’ pre-and post- knowledge of diabetes. The DKT2 consists of 23 questions and has been widely used by diabetes researchers, being a reliable (0.77) and valid (0.736) tool to assess diabetes knowledge and diabetes self-care (Fitzgerald et al., 2016). The interpreter test scores remained confidential using a subject-generated identification code, as shown in **Figure 1**. In addition to the DKT2, the interpreters were asked how many years of experience they have as a medical interpreter and whether they have anyone in their family diagnosed with diabetes, impacting their baseline knowledge of diabetes. Paired *t-*tests were conducted using excel to assess whether there was an improvement in diabetes knowledge scores after the intervention.

***Phase 2: Effects After Integrating Interpreters into DCM***

**Sample and Design***.* In June 2020, 122 Spanish-speaking patients were identified as being eligible for the DCM program. The inclusion criteria for this cohort required the patient have an established primary care provider at Riggs CHC, that they had been diagnosed with diabetes, that they were aged 18 years or older, that their primary language was Spanish, and that they had an HbA1C of 8.0% or greater. Exclusion criteria included any patient that had already been included in the DCM or that did not meet any of the inclusion criteria. Although these patients were selected to receive DCM support, they were not contacted for several months due to the lack of a bilingual nurse at the clinic. After the interpreter training, 122 of these patients were assigned to 5 interpreters who began making phone calls in February 2021. Whenever the interpreter called the patient for the first time, they invited them to join the DCM program, obtained verbal consent, and notified them they would be called at minimum once every three months to discuss their diabetes. According to the DCM program standards, phone calls were conducted, which includes providing diabetes education regarding diet and exercise, developing goals with the patient, reinforcing any instructions from the provider at the previous visit, addressing any diabetes questions or concerns, and reminding the patient of their next appointment.

 **Measures and Data Analysis Strategy***.* Retrospective deidentified patient data was collected on May 28, 2021, after approval from IRB. This data was from the cohort of individuals assigned to the interpreters for DCM. The patient demographic data collected included age, gender, and insurance status. Pre- and post- interpreter intervention biomedical data were also collected, including HbA1C, weight, body mass index (BMI), and blood pressure (BP). The number of DCM patient encounters/phone calls was also collected. Descriptive statistics were calculated to assess demographic data. Tests for statistical differences between baseline and follow-up biomedical data were conducted using paired *t-tests* using SAS 9.4 and p $\leq $ 0.05. All analyses were performed using a 5% type 1 error rate.

**Results**

***Phase 1: Training of the Interpreters to be Promotores***

The DKT2 demonstrated an increase in diabetes knowledge among the interpreters. The overall pre-test score was 15.4 correct answers out of 23 questions (66.96%), and the overall post-test score was 19.6 correct answers out of 23 questions (85.22%). There was a statistically significant increase (*p*= 0.012), as shown in **Table 1**, in the pre and post-test scores, supporting the hypothesis that the three- one-hour training sessions on the basics of diabetes improved the diabetes knowledge of the interpreters. After further DKT2 analysis, the greatest diabetes concept area of improvement among the interpreters was regarding signs and symptoms of hyperglycemia and hypoglycemia, including the effects of medication and lifestyle interventions on glucose. Only one interpreter answered that they have a family member diagnosed with diabetes, which did not correlate with a higher test score, nor did the length of time working as a medical interpreter (8 years).

***Phase 2: Effects After Integrating Interpreters into DCM***

Between February 2, 2021, and May 27, 2021, 68% (83 of the 122 assigned Spanish-speaking patients) had 121 telephone contacts with the interpreter as part of the DCM program. An interpreter did not contact the remaining patients because they were unavailable to reach by phone, had moved out of the state, or were no longer a patient of Riggs. Out of the 122 patients, 35 patients were considered for analysis to determine the impact of participating in the DCM if they had at least 6 weeks post the initial DCM phone call by the interpreter and before their follow-up A1C. Another 19 patients were utilized for comparison to the contacted group as they had been unavailable to receive a phone call or were not contacted but had baseline and follow-up biomedical data similar to the contacted group. The characteristics of those who were contacted and the comparison group are described in **Table 2**. The mean age for patients who the interpreters contacted was 55 years old; 69% were female, and 63% did not have insurance.

There was no statistically significant change in the HbA1C among the contacted or the comparison patients, as displayed in **Table 3**. The mean average HbA1C for the contacted patients increased from 9.5 to 9.7. However, all of the contacted patients (n=6) who had greater than 4 months between their pre-and post- HbA1C assessments had a statistically significant increase in average HbA1C of 1.4% (*p* < 0.0323), as shown in **Table 4**. The average A1C of the comparison group was more remarkable at baseline (10.6) compared to that of the contacted group (9.5), which may allow for greater potential in a decrease of HbA1C. There was no statistically significant difference in the weight, BMI, or BP of neither the contacted nor the comparison group.

**Discussion**

 This project is unique compared to other CHW-interventions, as it used currently staffed Spanish medical interpreters as *promotores* to provide basic diabetes education to an underserved Hispanic patient population at a CHC. The training of CHWs is usually extensive, often exceeding 90 hours, as CHWs are trained to provide health promotion and education on several chronic illnesses (Carrasquillo et al., 2017; Kane et al., 2016; Perez et al., 2015; Spencer et al., 2018). The interpreters in this project received a total of 3 hours of training and a binder of resource materials on the basics of diabetes education. All the interpreters improved their diabetes knowledge, which prepared them to be integrated into the DCM program. They were able to conduct 121 telephone contacts among 83 patients in over just 3 months while still performing their interpreter duties.

During the interpreter-patient phone calls, the topics most reviewed were that of diet and signs of high and low blood sugar, while all medication concerns were escalated to the nurse or provider. For example, one patient reported that they did not know how to use their glucometer during a phone call, and the interpreter scheduled an appointment with the nurse for education. Many interpreters documented having mailed diabetes diet information to the patient using resources found in the patient education library section of the ADA’s resources for CHWs webpage. The interpreters would often call the patient a few days after the patient’s diabetes appointment to remind the patient of the provider’s instructions while also clarifying any misunderstandings or reaching out to the provider if necessary. During the phone calls, the interpreter would remind the patient of their upcoming appointment or help the patient schedule an appointment if they were overdue.

Although the preliminary HbA1C results after initiation of interpreter intervention were not significant, this may be related to several factors. First, due to the project time constraints, this intervention could only be assessed after four months of initiation. A longer time would be needed to truly evaluate the impact of the diabetes education and support of the interpreters, as similar studies were analyzed over 12 months (Aponte et al., 2017; Carrasquillo et al., 2017; Kane et al., 2016). Second, several variables have been found to impact glycemic control, such as age, diet, exercise, duration of diabetes illness, occupation, medication type and compliance, and presence of comorbidity (Ahmad et al., 2014; Haghighatpanah et al., 2018). Third, many of the participants only received one phone call between their pre-and post- HbA1C comparison, and this is likely not going to result in a dramatic improvement in glycemic control. Fourth, while the effects of the COVID-19 pandemic are still being discovered, there is evidence of worsening glycemic control due to poor eating and exercise habits, lack of access to primary care services and diabetes medications, and psychological effects of anxiety and depression (Misra & Bloomgarden, 2020; Munekawa et al., 2021).

With the increase in demand for primary care services, it is challenging to provide comprehensive diabetes care required for patients with uncontrolled diabetes. One of the most significant impacts of this project, revealed in the data results, was the importance of the interpreters contacting the patients with uncontrolled diabetes who have not had their HbA1C checked in over 4 months, as these patients had a significant increase in HbA1C. When the interpreter called these patients, they were able to discuss their diabetes and schedule an appointment with their provider to monitor their glycemic control. Although a patient survey was not formally conducted, the interpreters revealed that many patients appreciated receiving phone calls to help them stay motivated to manage their diabetes and follow their goals of lowering their HbA1C. Therefore, even though the preliminary HbA1C results of this project were not significant, the long-term impact of the inclusion of the interpreters into DCM has yet to be determined, as the interpreters will continue to provide this additional support and education to the Spanish-speaking patients with diabetes at Riggs CHC.

***Limitations***

There are a few limitations to this project. First, the project was conducted at a single urban clinic, limiting the generalizability of the findings. Second, retrospective data made it difficult to compare those who were contacted, as there was variation in the time between phone contact and follow-up HbA1C. Third, was a limited amount of time to analyze the actual effects of the utilization of interpreters in DCM. Fourth, there was an inability to eliminate variables and isolate the interpreter intervention for data analysis. Lastly, it is difficult to measure the impact of the COVID-19 pandemic on the project implementation and results.

**Implications**

***Systems Implications***

 Riggs CHC established the DCM program with efforts to improve outcomes among its patients with uncontrolled diabetes. It was initially designed to be a nurse-driven diabetes education and support program; however, the interpreters were integrated into the DCM program through this project. The interpreters were trained on their specific role within the program and were instructed on how to respond when presented with patient concerns outside of their scope and training. This intervention included low-intense training, and the phone calls were able to be made between in-clinic interpretations, allowing for sustainability. As part of the DCM team, the interpreters collaborated with the providers and nurses to support and educate high-risk patients. This allowed the interpreter to function as a culture broker, providing culturally sensitive education, as they understand the Hispanic population's social norms, cultural values, and dietary preferences.

 On a larger scale, utilizing the interpreter as modified CHWs or *promotores* may address heal disparities among the Hispanic population. Healthy People 2030 targets Social Determinants of Health (SDOH) to improve health equity and wellness for all (Office of Disease Prevention and Health Promotion, 2021). This project aligns with specific objectives aimed at improving health communication for those with limited English proficiency (HC/HIT-02 &D11), providing greater access to high-quality primary care services (AHS-R01), and increasing the health literacy of the population (HC/HIT-R01). Community health workers can help overcome language and cultural barriers, assist patients in navigating the complex U.S. healthcare system, and promote health advocacy (Malcarney et al., 2017; Olaniran et al., 2017). Both the AADE (2019) and ADA (2019) support the role of CHWs in various healthcare and public health settings to advance health equity and improve health literacy in underserved populations.

***Economics Implications***

Hispanics experience greater uninsured rates, as 18.7% of the Hispanic population living in the U.S. did not have health insurance in 2019, compared to 6.3% of the non-Hispanic white population (Keisler-Starkey, & Bunch, 2020). In this project, 81 of the 122 (66%) Spanish-speaking patients eligible for DCM did not have insurance. This SDOH can prevent an individual from seeking routine diabetes care, affording medications, and receiving formal diabetes education (ADA 2018). Providers must often select less favorable, cheaper medications to prescribe patients rather than the more effective, more expensive medications. Besides having high uninsured rates, Hispanics have lower average incomes compared to other ethnic groups living in the U.S. (U.S. Census Bureau, 2018), which can impact transportation to appointments and the ability to purchase healthy foods (Aguayo-Mazzucato et al., 2019). Without more affordable and accessible health care options, disparities are likely to continue among the Hispanic population.

The ADA (2019) recommends CHW-led interventions and other diabetes prevention programs as cost-effective approaches to improving diabetes care. Based on a systematic review analyzing the economic impact of using CHWs for chronic disease (Jacob et al., 2019), CHW-led interventions for the management of type 2 diabetes costs an average of $1,448 per year, saves an average of $140 per year, and costs an average quality-adjusted life year of $44,675, which is less than the usual $50,000 benchmark. This cost-saving is likely due to a decrease in HbA1C, which a 1% reduction in HbA1C is associated with an annual cost saving of $555 in diabetes-related healthcare costs (Lage & Boye, 2020). Compared to other CHW-led interventions, this project is a low-cost, sustainable intervention that utilizes current staff to offer free diabetes education and support to established patients. The DCM program is not a billable service; however, it could be billable in the future if an interpreter were to pursue a CHW certificate, which costs $1,500 in the state of Indiana (Indiana Community Health Workers Association [INCHWA], 2021). As of July 1, 2018, in the state of Indiana, Medicaid will provide reimbursement for face-to-face CHW services, supervised by a provider, in 30-minute units without prior authorization at 50% of resource-based relative value scale (RBRVS) (Indiana Health Coverage Programs [IHCP], 2018). Although this would be a reimbursement opportunity for Riggs CHC, it would only be billable to those carrying insurance.

***Policy Implications***

 At the clinic level, the Riggs CHC adjusted their DCM program policy to include interpreters. Critical components of this policy include the training of the interpreters, educational topics, documentation expectations, and plans for data analysis of the revised program. During the training, the trainer emphasized the scope of practice of the diabetes-educated interpreter and when to escalate a patient's concern to a nurse or provider. Future policy recommendations concerning this project include greater standardization of the program to improve patient data monitoring and increased intensity of diabetes education and support. In addition, if an interpreter would receive a CHW certification, the policy would need to delineate the role and function of a billable CHW within Riggs CHC.

 Prioritizing policies focused on interventions that utilize CHW to reduce health disparities and improve health outcomes would reflect the aim of Healthy People 2030 to improve health equity for all. Statewide associations and advisory boards are crucial to assemble stakeholders that support CHW education and certification, promote CHW utilization within health care services, and advocate for the CHW potentiality to improve public health outcomes (Nelson et al., 2016). In Indiana, the INCHWA (2021) advocates for CHWs by providing options for obtaining CHW certification and promoting policy advocacy for CHWs. A bill recently introduced in Indiana in 2021, HB 1147, would allow CHWs to be reimbursed for telehealth services at no more than 30 units per member each month, currently, 24 units per member per month, which could improve CHW utilization and reimbursement by Medicaid. Only when policies support the expansion and reimbursement of CHW services will they have a full impact in reducing disparities and improving population health among underserved communities.

***Practice Implications***

Multidisciplinary teams are vital to overcoming health disparities among vulnerable populations. This project allowed for the interpreter's role to be expanded to provide diabetes education and support to Spanish-speaking patients, many of whom were uninsured. The interpreters could conduct the DCM calls between their scheduled interpretations without overly disrupting or overloading the current workflow. They were able to make over 120 DCM phone calls providing lifestyle education, reinforcing provider instructions, encouraging medication compliance, addressing diabetes symptom concerns, scheduling appointments, and referring to the nurse or provider when necessary.

During an office visit, there is insufficient time to thoroughly discuss diabetes management, including cultural considerations, further supporting the role of diabetes-educated interpreter to the DCM team. Besides the phone calls, the providers at Riggs CHC could identify knowledge gaps during the appointment and then request the interpreter to spend extra time with the patient reviewing lifestyle management of diabetes before the patient leaves the clinic. Similar models of care have been described, in which the provider functions as a case coordinator, identifying and delegating lifestyle counseling to the CHW (Allen et al., 2014). The AADE (2019) encourages healthcare providers to acknowledge the unique abilities of CHWs to advance health equity, support the integration of CHWs into diabetes education programs, provide mentorship for CHWs, and advocate for utilization and reimbursement of their services.

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**Appendix**

**Figure 1:** *Interpreter Subject-Generated Identification Code and Additional Questions*



**Table 1**: DKT2 Analysis Results

|  |  |  |
| --- | --- | --- |
| **Interpreter** | **Pretest Score** | **Posttest Score** |
| 1 | 56.52% | 78.26% |
| 2 | 56.52% | 82.61% |
| 3 | 69.57% | 82.61% |
| 4 | 73.91% | 100.00% |
| 5 | 78.26% | 82.61% |
| Mean | 66.96% | 85.22% |
| Paired *t*-test | ***p* = 0.012** |

**Table 2:** Baseline Characteristics

|  |  |  |
| --- | --- | --- |
|  | **Contacted** | **Comparison\*** |
| Number: | 35 | 19 |
| Age Mean: | 55 | 51 |
| *18-39 years, n (%)* | 0 | 3 (16) |
| 40-59 years, n (%) | 23 (66) | 12 (63) |
| $\geq $*60 years, n (%)* | 12 (34) | 4 (21) |
| Female, *n* % | 24 (69) | 14 (74) |
| **No** insurance, *n* (%) | 22 (63) | 14 (74) |
| Baseline A1C: | 9.5 | 10.6 |
| *<8, n ( %)* | 9 (26) | 3 (16)  |
| *8-10, n (%)* | 10 (28) | 5 (26) |
| *10-13, n (%)* | 15 (43)  | 8 (42) |
| $\geq $*13, n (%)* | 1 (3) | 3 (16)  |
| Weight: | 181.9 | 170.2 |
| BMI (kg/m2): | 32.4 | 30.6 |
| Systolic BP (mmHg):  | 136.8 | 131.6 |
| Diastolic BP (mmHg):  | 78 | 77.6 |

\*Unable to reach or not contacted

**Table 3**: *HbA1C Pre- and Post Intervention Analysis (Post-Pre A1C)*

|  |  |  |
| --- | --- | --- |
|  | **Contacted** | **Comparison\*** |
| N | 35 | 18 |
| Pre A1C Mean | 9.5 | 10.6 |
| *<8, n( %)* | 9 (26) | 3 (16)  |
| *8-10, n (%)* | 10 (28) | 5 (26) |
| *10-13, n (%)* | 15 (43)  | 8 (42) |
| $\geq $*13, n (%)* | 1 (3) | 3 (16)  |
| Post A1C Mean | 9.7 | 10.0 |
| *<8* | 10 (28.6) |  4 (21.1) |
| *8-10* | 12 (34.3) | 5 (26.3) |
| *10-13* | 8 (22.9) | 8 (42.1) |
| $\geq $*13* | 5 (14.3) | 2 (10.5) |
| Change in A1C | 0.1457, SD (1.62) | -0.5737, SD (1.77) |
| *Decrease, n (%)* | 13 (37.1) | 12 (63.2) |
| *No change, n (%)* | 3 (8.6)  | 0 |
| *Increase, n (%)* | 19 (54.3) | 7 (36.8) |
| T value | -0.53 | -1.41 |
| Pr > | t | | 0.5991 | 0.1755 |

\*Not able to reach or not contacted

**Table 4.** *Time between pre and post A1C, 4 months (post-pre)*

|  |  |  |
| --- | --- | --- |
|  | $\leq $ **4 months** | **> 4 months**  |
| N | 29 | 6 |
| Pre A1C | 9.3 | 10.6 |
| Post A1C | 9.2 | 12.0 |
| Change in HbA1C | -0.1.069 | 1.3667 |
| T value  | -0.36 | 2.94 |
| Pr > | t |  | 0.7231 | 0.0323 |