FEATURE ARTICLE

Improving Self-Care Management in Low-Income Latinos With Type 2 Diabetes Using Peer-Led U.S. Conversation Maps: A Quality Improvement Project in a Free Clinic

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A culturally sensitive Healthy Interactions Conversations Maps program was implemented for teaching diabetes self-management education (DSME) to Latinos with type 2 diabetes using peer-led educators in a community health center. Patients were invited to participate in a group care setting to improve access to providers and DSME. Goals were to improve diabetes distress, self-efficacy, and glycemic control as measured by A1C. Significant improvements were found for mean diabetes self-efficacy scores from before (2.53 ± 0.59) to after (2.91 ± 0.50) DSME ($P < 0.001$). Mean A1C decreased significantly from before (9.51 ± 1.72%) to after (8.79 ± 1.68%) DSME ($P = 0.043$) at the end of the 6-month intervention. Thus, this program was found to be a useful tool for providing DSME in community health clinics serving low-income Latinos.

As the fastest growing racial/ethnic minority, Latinos are disproportionately affected by diabetes, and their risk of developing diabetes is 66% higher than that of Caucasians (1). Moreover, Latinos are twice as likely as Caucasians to die of diabetes-related complications (1). Less than half of Latinos with type 2 diabetes are able to achieve the recommended A1C goal of <7.0% (2).

Social Cognitive Theory (SCT) proposes that individuals with high self-efficacy are more likely to change their behavior, make healthy choices, be more positive in self-attribution, and have a better sense of control (3). The American Diabetes Association's (ADA's) *Standards of Medical Care in Diabetes* (4) recommend that primary care providers offer patient-centered group or individualized diabetes self-management education (DSME) to patients to assist them in achieving the key goals of improved diabetes self-management, clinical outcomes, health status, and quality of life.

The ADA also recommends routine monitoring for diabetes distress (DD) using validated measures to address areas of self-care that are most relevant to patients and affect their clinical management (4). Patients often experience a considerable degree of emotional involvement in diabetes care, which can cause anxiety and depression (5). Depression is two times more prevalent in patients with type 2 diabetes than in those without diabetes; however, there is a distinction between depressive psychiatric disorders and diabetes-related distress (5).

DD and DSME: Literature Review

DD is defined as patients' personal concerns about their disease management, providers, family support, emotional burden, and access to health care (6). High levels of DD have been associated with worse clinical and psychosocial outcomes (5). A recent systematic review and meta-analysis of 55 studies reported a 36% overall prevalence of DD in people with type 2 diabetes (7). However, female sex and comorbid depressive symptoms could act as potential confounders, limiting the ability to effectively measure DD (7).

DD is more closely associated with diabetes self-management and diabetes-related behavioral and biomedical outcomes than depression (7). Specifically, high levels of DD are related to worsening glycemic control (7). A meta-analysis of randomized controlled trials noted that interactive self-management interventions help reduce

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A1C (by a mean of −0.43%), improve diabetes knowledge, enhance self-efficacy, and reduce DD (8). The behavioral interactive self-management techniques implemented in trials included providing feedback to patients on performance, problem-solving, and action-planning.

A systematic review of 13 randomized controlled trials concluded that DSME in conjunction with primary care effectively improved glycemic control in Latino adults with type 2 diabetes (9), with greater reductions if a multimodal, multiprovider, culturally sensitive DSME program was used (9,10). In this review, multiple types of educators (e.g., medical care providers, certified diabetes educators [CDEs], and peer educators) administered the DSME sessions; however, peer educators alone appeared to be effective (9).

Subgroup analysis from this review suggested that culturally tailored DSME interventions involving both trained diabetes educators and peer educators may provide the greatest benefit (9). Peer-led diabetes self-management, a potential low-cost, flexible modality, has been found to successfully maintain key improvements in A1C in rural communities (11,12). Providing bicultural/bilingual educational materials and involving team members from the community can enhance the cultural sensitivity of DSME programs (13).

To meet the increasing demand for delivery of health care services to a large number of patients with chronic disease, many health care professionals (HCPs) have adopted a group care model. Group care strategies involving interactions with HCPs (either in person or via telephone) have been found to have large effect sizes than other strategies (9,14). A systematic review and meta-analysis of 26 studies demonstrated that group medical visits had a positive effect on clinical and patient-reported outcomes and yielded a significant reduction in mean A1C (−0.46%, 95% CI −0.80 to −0.31) (15). It is important to note that the most successful DSME interventions in Hispanic patients with diabetes were culturally tailored, whether administered in person to individuals or groups or in multimodal sessions (9).

This pilot project used a culturally sensitive, evidence-based U.S. Conversation Maps program (16). The Healthy Interactions Conversation Maps (available in English and Spanish) were developed in collaboration with the ADA for use in the United States and with the International Diabetes Federation for use elsewhere in the world (16). Conversation Maps are designed to be used in a small group environment, encourage peer involvement, and deliver patient-centered education. A 2017 meta-analysis (17) examined glycemic outcomes using the Conversation Map tools to deliver DSME and included 851 participants in nine studies from five countries. All cohorts showed significant reductions in A1C (overall mean reduction −0.84%) (17). Another meta-analysis by Yang and Fang (18), with data from 3,360 patients in 22 trials, noted significant reductions in fasting blood glucose, 2-hour postprandial blood glucose, and A1C levels compared with individuals in control groups.

Study Objectives

The first aim of this quality improvement (QI) project was to determine whether implementing a culturally sensitive Healthy Interactions Conversations Maps DSME program with peer educators for Latinos with type 2 diabetes in a community health clinic could improve self-efficacy as measured by the Lifestyle Self-Efficacy Scale for Latinos with Diabetes (LSESLD) (19). The LSESLD was used to assess participants for improvement in perceived control and confidence over 6 months. The second aim of the project was to determine whether implementation of this program over 6 months could reduce DD as measured by the 17-item Diabetes Distress Scale (DDS-17) (20). A final aim was to improve A1C by 0.5–1.0% within 6 months for patients with an A1C >7% at baseline.

Design and Methods

This QI project had a two-sample, paired, pre-/post-test intervention design. Outcome variables included self-efficacy, DD, depression, and A1C. Descriptive data included participants' sex, age, country of origin, BMI, insulin use, duration of diabetes, history of hypertension and hyperlipidemia, and number of DSME sessions attended. The LSESLD was used to assess self-efficacy related to diabetes self-management (19). The DDS-17 was used to measure changes in DD (21). Both scales were used with the permission of their developers. The Patient Health Questionnaire (PHQ-9) was used to screen for symptoms of depression and is in the public domain (22).

The project was formally evaluated using a QI checklist and determined to not be human subject research by an internal review process at Duke University School of Nursing.

Setting and Patient Population

The project was implemented at Camino Community Center, a free health community clinic in the Charlotte, NC, metropolitan area. The free clinic serves ~3,000 patients who are mostly Latino and

all uninsured and earning less than 200% of the federal poverty level. The community center provides several services, including a medical and mental health clinic, a food pantry, and a fitness center. Its mission is "to equip people to live healthy, hopeful, and productive lives" (23).

Each group session included 8–10 patients. Each participant was asked to physically attend four unique group sessions within the 6-month period. Optional make-up sessions were offered for each Conversation Map discussion session at the end of the 6-month period. Patients were eligible to participate if they were low-income (<200% of the poverty level), ≥18 years of age, and had uncontrolled type 2 diabetes as indicated by an A1C >7%. Exclusion criteria included the presence of end-stage renal disease, diagnosed pregnancy, or impaired vision or blindness.

The clinic staff includes one physician, one nurse practitioner, a CDE, a diabetes health coach, an adult psychologist, and two peer educators, all of whom are bilingual. Sending routine motivational text messages to patients between appointments, with the objective of maintaining patient engagement, is a standard of care in the clinic.

Gaining access to bilingual providers has been a chronic challenge for patients at the clinic; there is an average wait time of more than 2 months for appointments for new diabetes patients. HCP visits have also been lengthy because of the time spent attempting to educate patients about diabetes self-management. One goal of this project was to improve access to HCPs by adopting a group care model and thereby reduce wait times for new patients and improve attendance at DSME sessions.

Data Collection

The project was championed by the full-time family nurse practitioner at the clinic and lasted for 8 months. The peer educators were patients with diabetes who had successfully completed DSME, had high literacy, and could navigate the U.S. Conversation Maps easily. Peer educators signed a confidentiality and participation agreement form before participating and received facilitator training in the use of the Healthy Interactions U.S. Conversation Maps (16). Both the CDE and the diabetes health coach also completed facilitator training and agreed to participate in the DSME sessions. Facilitator training occurred in two 1.5-hour sessions in September 2018.

The medical care providers invited patients to participate in group care during regularly scheduled appointments in the months before the program's implementation, after reviewing patients' medical records for inclusion criteria. The clinic adapted its scheduling system in anticipation of scheduling 8–10 patients for each diabetes group session, preferably on the same day of their HCP office visit, to facilitate implementing the group care model. The group sessions were held three times monthly during the 8-month implementation period. Group sessions were suspended for December holidays because of anticipated low attendance. Each group was limited to 8–10 participants (Figure 1).

Participants began in September 2018 by completing their pre-implementation questionnaires (PHQ-9, DDS-17, and LSESLD) in either a hard copy format or an electronic, Health Insurance Portability and Accountability Act–compliant JotForm format via a digital tablet (19,20,22). The LSESLD demonstrates good internal consistency, reasonable construct validity, and sensitivity to intervention-related changes over time (19). It has been found to be a reliable and valid research instrument for assessing self-efficacy related to diabetes self-management in low-income, Spanish-speaking populations (19). The DDS-17 also demonstrates strong reliability, good convergent validity, and excellent criterion validity, making it an excellent psychometric instrument for identifying DD (21). The PHQ-9 is a validated brief questionnaire with a sensitivity of 88% and a specificity of 88% for identifying symptoms of depression (22).

Responses from the pre-implementation questionnaires were loaded into the electronic health record (EHR) system and into an Excel spreadsheet for later statistical analysis. If moderate to severe levels of depression were found via the PHQ-9, those patients were automatically referred to the clinic's mental health therapy department. Blood was drawn before patients left their initial visit and sent to Quest Laboratory for A1C analysis.

Each group session lasted for 1–1.5 hours. For two of the diabetes group sessions, patients were also scheduled to see their HCP individually for their usual quarterly 15-minute follow-up appointments, which took place either just before or just after the group session, and their blood was drawn for A1C measurement as part of these routine visits. During the months with no group visits scheduled (December and March), all patients were engaged via a telephone medical encounter, and a follow-up motivational text message was sent after those encounters.

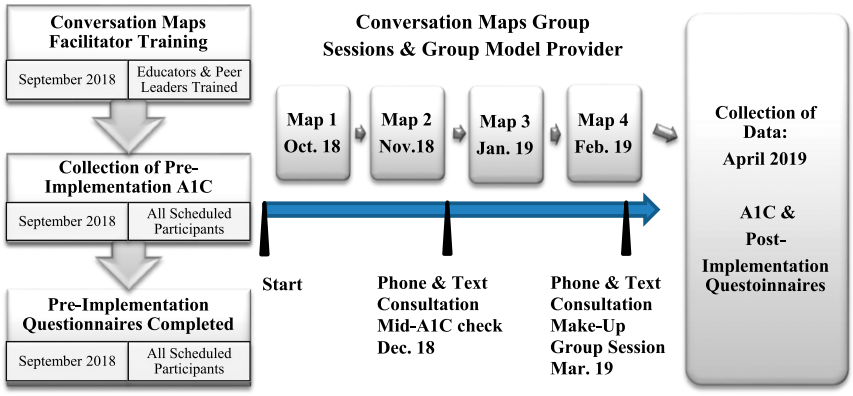

FIGURE 1 Project timeline.

Additional clinic visits were added upon patient request or necessity. Make-up sessions were offered in March 2019.

Post-implementation questionnaires were administered in March and April during patients' final visit for laboratory testing and were entered into the EHR system and Excel spreadsheet.

Data Analysis

Descriptive statistics were used to summarize the data. Paired *t* tests were conducted to determine differences from baseline measurements to end-of-program measurements. Data analysis was performed with SPSS statistical software, v. 24.0 (IBM, Armonk, NY) (24). Because female sex and depressive symptoms are potential confounders to accurate assessment of DD (25), a repeated-measures ANCOVA (rANCOVA) was performed to adjust for these factors. The rANCOVA compares means across one or more variables that are based on repeated observations while controlling for a confounding variable.

Results

A total of 46 patients were invited to participate in the diabetes group care visits and group education sessions. Of these, 11 did not participate because of difficulties in attending back-to-back monthly sessions. Thirty-eight signed up to participate and reserved a space in a group appointment. Figure 2 describes the patient flow from pre-implementation through the educational sessions to post-implementation. Three patients dropped out of the program after the first session because of either relocation, inability to take time off from work, or lack of transportation. This left 35 participants who completed the DSME program.

Table 1 presents the baseline demographics of the population included in the project (n = 38). All of the

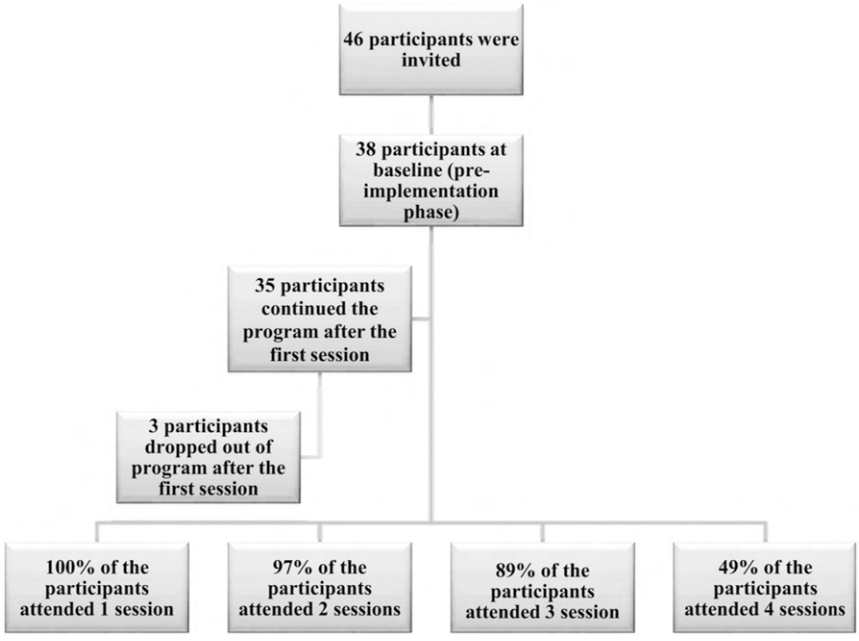

FIGURE 2 Progression of convenience-sampled participants from the baseline pre-implementation phase through all group sessions to post-implementation.

TABLE 1 Baseline Demographics of All Study Participants Compared with Those Who Participated in the DSME Program

	All Participants (n = 38)	Implementation Group (n = 35)
Total sessions attended		
1	38 (100)	35 (100)
2	34 (89)	34 (97)
3	31 (82)	31 (89)
4	17 (45)	17 (49)
Country of origin		
Ecuador	3 (8)	3 (9)
Mexico	24 (63)	21 (60)
Honduras	4 (10)	4 (11)
El Salvador	2 (5)	2 (5)
Guatemala	3 (8)	3 (9)
Venezuela	1 (3)	1 (3)
Columbia	1 (3)	1 (3)
Age, years		
30–40	10 (26)	9 (26)
41–50	12 (32)	10 (29)
51–60	13 (34)	13 (36)
61–70	2 (5)	2 (6)
71–80	0 (0)	0 (0)
>80	1 (3)	1 (3)
Sex		
Female	24 (63)	21 (60)
Male	14 (37)	14 (40)
BMI, pre-implementation, kg/m^2		
25–29 (overweight)	10 (26)	10 (28)
30–39 (obesity)	21 (47)	19 (55)
>40 (morbid obesity)	7 (18)	6 (17)
BMI, post-implementation, kg/m^2		
25–29 (overweight)	8 (21)	8 (24)
30–39 (obesity)	23 (60)	22 (64)
>40 (morbid obesity)	4 (10)	4 (12)
Insulin		
Yes	22 (58)	22 (63)
No	16 (42)	13 (37)
Duration of diabetes, years		
0–5	12 (32)	10 (29)
6–10	15 (39)	14 (40)
>10	11 (29)	11 (31)
Hypertension		
Yes	27 (71)	26 (74)
No	11 (29)	9 (26)
Hyperlipidemia		
Yes	33 (87)	30 (86)
No	5 (13)	5 (14)

Data are n (%). In each session (1–4), a U.S. Healthy Interactions Conversation Map was discussed.

participants were of Latino descent, lacked medical insurance, earned less than 200% of the federal poverty level, and were overweight or obese. The mean duration of diabetes for all 38 participants was 5.68 ± 3.2 years. More than half of the participants (58%) used insulin. Most participants had hypertension, hyperlipidemia, uncontrolled blood glucose, and obesity, indicating that they were at high risk of developing diabetes complications. Figure 3 depicts the percentage of comorbidities in patients who completed the DSME intervention.

Of those who completed the DSME program (n = 35), 89% attended three sessions, and 49% attended four sessions. Although lowering BMI was not a primary aim of the program, mean post-intervention

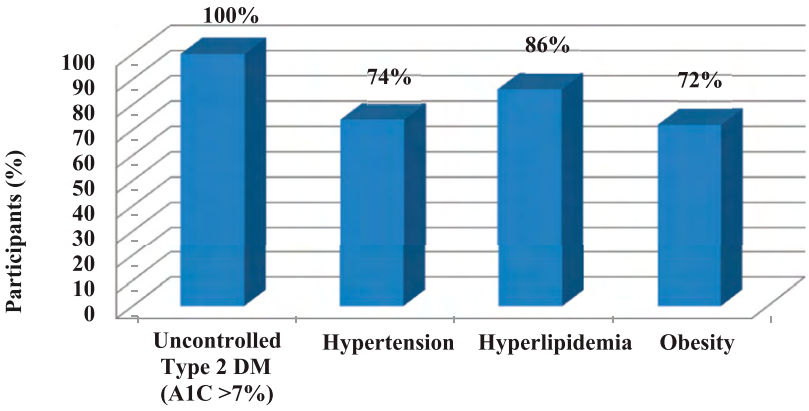

FIGURE 3 Comorbidities at baseline for DSME intervention participants (n = 35). DM, diabetes.

BMI for DSME completers (n = 35) was 33.4 ± 6.4 kg/m^2 compared with 33.7 ± 6.9 kg/m^2 pre-intervention.

The program's first aim was to demonstrate improvement in participants' self-efficacy after 6 months, as measured by the LSESLD. The LSESLD includes 17 items on self-efficacy with regard to diet, physical activity, self-monitoring of blood glucose, and overall diabetes self-management, with higher scores indicating greater self-efficacy (19). A paired t test was conducted to compare self-efficacy scores before and after the intervention. As shown in Figure 4, LSESLD scores improved significantly post-implementation compared with baseline (mean score 2.53 ± 0.59 vs. 2.91 ± 0.50, P <0.001). There was no significant association between a half-point increase in self-efficacy and attendance at DSME sessions (χ^2 [df = 3, n = 35] = 5.7, P = 0.125), but the effect size was large (Cramér's ϕ_c = 0.41).

An rANCOVA was performed to compare the effectiveness of the culturally sensitive DSME in reducing DD. The DDS was used to evaluate for distress in four subgroups, including emotional burden, physician distress, regimen distress, and interpersonal distress. Higher scores indicated higher levels of DD (21). Thirteen participants (38%) demonstrated DD (DDS >2.0) at baseline. Sex (female/male) and depression as measured by the PHQ-9 were used as covariates in this analysis.

Sex differences in DD were not present, when accounting for depression (P = 0.650 and 0.112 for pre- and post-intervention scores, respectively). After adjusting for pre-intervention history of depression, there was a significant improvement between pre- and post-intervention DD scores (P <0.001). The mean pre- and post-intervention DD scores shown in Figure 5 indicate an improvement from moderate distress to no distress after the DSME program (pre-intervention DDS mean score 2.1 ± 1.1; post-intervention DDS mean score 1.6 ± 0.65).

A paired-samples t test was used to compare A1C before and after the intervention. Only 3 of the 35 participants completing the program (9%) had an A1C score between 7 and 7.5% at baseline. A1C decreased significantly from before (mean 9.51 ± 1.72%) to after (mean 8.79 ± 1.68%) the DSME program (P = 0.043). Figure 6 depicts the comparison of A1C at all three time points: pre-implementation, mid-implementation, and post-implementation. There was no significant association between a reduction in A1C and attendance at DSME

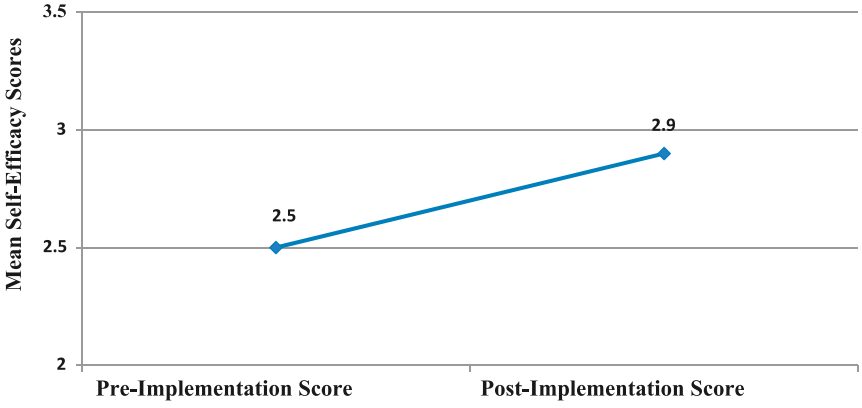

FIGURE 4 Comparison of mean self-efficacy scores before and after the DSME intervention.

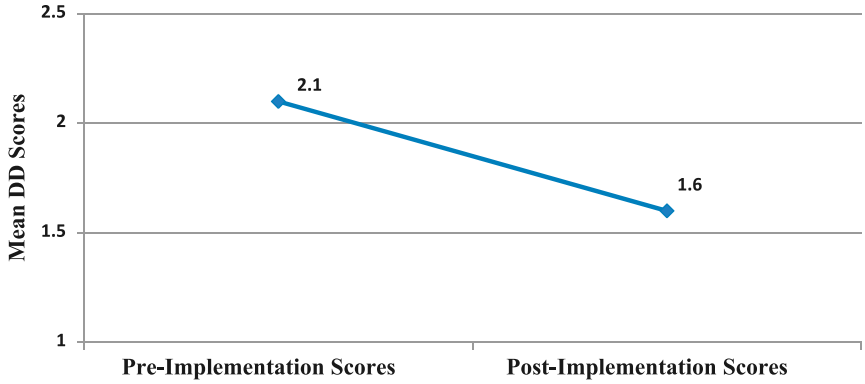

FIGURE 5 Comparison of mean DD scores before and after the DSME intervention.

sessions (χ^2 [df = 3, n = 35] = 6.1, P = 0.106), but the effect size was large (Cramér's ϕ_c = 0.42).

Dicussion

This project was effective in improving self-efficacy, reducing DD, and improving glycemic control as indicated by A1C after delivery of an interprofessional, multimodal, culturally sensitive, peer-led DSME program in low-income Latinos in a community health clinic. This care model also aligns with the ADA's national standards for quality DSME programs and the recommendation of routine monitoring for DD with validated measures (4).

Many of the patients who visit the clinic have limited sick leave or vacation days and face challenges with transportation, which often results in missed appointments with the CDE for one-on-one DSME. From May 2018 to May 2019, 40% of all clinic patients (n = 22) who were scheduled for 1:1 DSME were no-shows. During rescheduling phone calls, patients reported that not being able to miss more time from work was the main cause of their no-show. Incorporating the group care model and group DSME sessions on the same day alleviated this stress on the patients.

Additionally, the wait time for new patient diabetes appointments decreased from >2 months to 4–6 weeks. HCPs spent less time on education during routine individual clinic visits because patients received thorough education in their group sessions.

Studies have found that, despite the proven benefits of DSME, only 6.8% of individuals with newly diagnosed type 2 diabetes participate in such education within 12 months of diagnosis. Our intervention facilitated strong attendance at DSME sessions (26).

The program offered in this QI project has become a standard of care at the clinic since August 2019. The clinic now offers one Conversation Maps topic per quarter. The group medical care model with diabetes sessions are now offered monthly.

During the project, some patients brought their spouse, parent, or caregiver to sessions. The participants made comments such as, "Me gusta mucho las clases de diabetes y estoy aprendiendo bastante," which in English means, "I really like the diabetes class, and I am learning a lot." They reported that the classes were informative, easy to understand in their native Spanish language, and realistic with regard to their life experiences. Insulin-dependent participants reported improved understanding of glucose levels and medication management. The participants

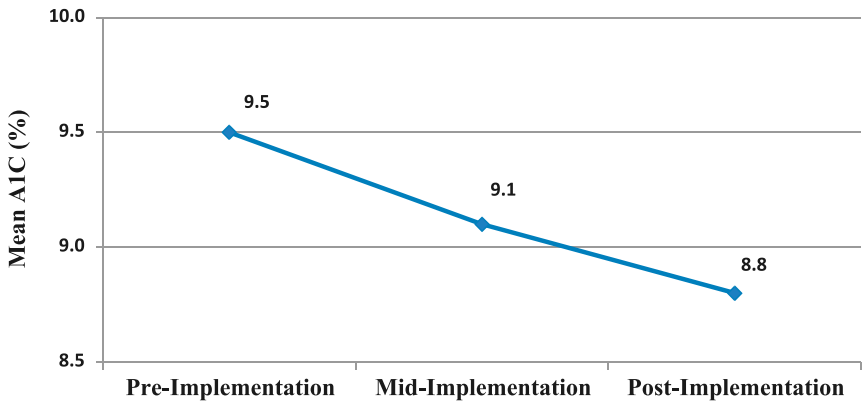

FIGURE 6 Comparison of mean A1C at time points before, during, and after the DSME intervention.

enjoyed hearing testimonies from their peer educators. During each session, patients were offered healthful snacks or meals to try that were often cooked by the peer educators themselves. Sample foods included homemade vegan tortillas, quinoa salad with reduced-carbohydrate tortilla chips, black rice, Greek yogurt, and fruits.

Patients had an opportunity to write their short- and long-term goals and to plan and document how they would engage with a support network or their health care team to improve their diabetes control and overcome barriers they faced. As a result, patients reporting financial difficulties with regard to purchasing groceries were referred to the community center's food pantry. Other patients were referred to the NC Medassist Pharmacy (27) for free medications or provided with free samples from the medical assistance program Americares (28). Those who reported a lack of access to exercise equipment were offered a monthly subscription to the community center's Camino Fitness gym, which was conveniently located beside the clinic.

Limitations

A few limitations to this project that should be acknowledged. Group sessions were clustered back-to-back in a 6-month time period. However, each U.S. Healthy Interactions Conversation Map has a separate focus, and the maps do not have to be used in a specific sequence. Thus, it would be easy for patients to attend diabetes group sessions every 3 months on the same day as their routine follow-up medical appointment. This scheduling change was permanently implemented after the pilot project, starting in August 2019, which facilitated sustainable, comprehensive care without requiring patients to miss additional time from work.

Screening questionnaires were offered in both paper and electronic formats. However, it was quickly noticed that patients were having great difficulties in completing their forms electronically via the tablet because of either literacy challenges or discomfort with the technology. Future sessions will assign a staff person to assist patients with questionnaires.

Public safety was one social determinant of health that affected patients during their group DSME program. During the last 3 months of the program, local immigration laws were heavily enforced in the Charlotte, NC, region creating fear and safety concerns for many of our participants. These concerns led many to refuse to leave their home to pick up their prescriptions at the pharmacy. On a more positive note, the clinic provides comprehensive services for patients who cannot overcome other social determinants of health. For example, the clinic offered quick access to the light rail transportation system located just behind the community center. The center also provided an array of professional and social support during the group sessions that may not have been practical to provide in other settings.

A final limitation was the project's small sample size. Repeating this QI project with a larger population of patients could provide more information to inform best practices for implementation.

Conclusion

Self-efficacy scores, A1C, and DD all improved in patients who attended this culturally sensitive, peer-led DSME program. Free community clinics serving Latinos should consider implementing group care models with culturally sensitive DSME programs to help reduce delays in access to care, offset barriers associated with transportation or missed work time, and improve attendance at follow-up appointments.

Our population earned <200% of the federal poverty level. Despite facing difficult social determinants of health, these patients improved their self-efficacy, worked to expand their support network, and became more aware of the importance of asking for assistance. Program participants openly communicated their concerns and, in turn, received additional resources to improve their quality of care. This process supports the SCT tenet that individuals with high self-efficacy will be more likely to change their behavior and make healthier choices as they acquire knowledge and gain confidence (6).

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DUALITY OF INTEREST

No potential conflicts of interest relevant to this article were reported.

AUTHOR CONTRIBUTIONS

C.R.F. researched data, wrote the manuscript, contributed to discussion, and reviewed and edited the manuscript. K.P. wrote the manuscript, contributed to discussion, and reviewed and edited the manuscript. B.I.P., I.F., and C.P. contributed to discussion and reviewed and edited the manuscript. S.A. reviewed and edited the manuscript. C.R.F. is the guarantor of this work

and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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