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Shared Medical Appointments: An Innovative Model to Reduce Health Disparities Among Latinxs With Type-2 Diabetes

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Abstract

In the United States, diabetes is epidemic. A study of Latinxs with diabetes evaluated a behavioral shared medical appointment (SMA) intervention. This quasi-experimental study included nonrandomized matched control group participants receiving usual care. The nonprobability convenience sample consisted of 90 participants (SMA = 30; control = 60) receiving primary care at an FQHC (Federally Qualified Health Center) clinic. At 6 months, the percentage of participants achieving target A1C goals was greater in the intervention group (58.6%) than in the control group (31%; $\chi^2 = 4.462$, $p \leq .05$). At 3 months, A1C declined by 0.55% ($b = -0.55$, $t = -1.48$, $p = .14$); at 6 months, A1C declined by 0.83% ($b = -0.83$, $t = -2.25$, $p = .03$); 3- and 6-month declines were greater in the SMA group than in the control group. Underserved, underinsured Latinxs in the ALDEA program achieved

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significant A1C reductions; the program succeeded in empowering Latino patients and improving glycemic control.

Keywords
shared medical appointments, group medical visits, Latinxs, Hispanic, type 2 diabetes

The prevalence of diabetes has increased exponentially over the last three decades and has reached epidemic proportions in the United States. An astounding 29.1 million people—9.3% of the U.S. population—currently lives with diabetes (Centers for Disease Control and Prevention, 2017). Moreover, abundant research has documented persistent racial–ethnic disparities in both diabetes prevalence rates and quality of care. In comparison with White counterparts, fewer Latinxs, African Americans, and Native Americans who have type 2 diabetes receive standard diabetes care, such as immunizations, foot examinations, ophthalmology screenings, and diabetes education (Brown & Hanis, 2014).

Although over the last 10 years the population of people with type 2 diabetes has made steady progress toward achieving goals regarding glycated hemoglobin (A1C; $\leq$ 7% or $\leq$ 8%), blood pressure (BP; $\leq$ 140/90), and low density lipoprotein (LDL; $\leq$ 100), the percentage of this population that misses target goals remains high—between 33% and 49% (Stark Casagrande, Fradkin, Saydah, Rust, & Cowie, 2013). Nationwide, only 14% of people with diabetes meet all three target goals (A1C, BP, and LDL) and are nonsmokers (Stark Casagrande et al., 2013). Despite the known efficacy of Diabetes Self-Management Education and Support (DSMES; Brown & Hanis, 2014), only half of the adults with diabetes report ever receiving formal diabetes education or attending self-management classes (Stark Casagrande et al., 2013).

In response to the deficits in standard medical care for adults with diabetes, the American Diabetes Association (ADA; 2019) called for a change in the delivery of care to improve diabetes management and outcomes. Furthermore, the ADA proposed the chronic care model (CCM) as an effective framework for improving quality of care for people with diabetes (ADA, 2019). The CCM includes six core elements: (a) delivery system redesign, (b) self-management support, (c) decision support, (d) clinical information systems, (e) community resources and policies, and (f) health systems. Over the last decade, evidence has emerged suggesting CCM is an effective framework to improve the care of individuals with chronic disease (Coleman, Austin, Brach, & Wagner, 2009).

As an intervention for adults with diabetes, shared medical appointments (SMAs) include at least three of the CCM's six core components: delivery system redesign, self-management support, and decision support. SMA constitutes a model of care where planned visits are coordinated for a group of patients in the context of a multidisciplinary team (Coleman et al., 2009; Wagner et al., 2001). This model has become a popular method to increase access to DSMES in the context of primary care (Cohen et al., 2011; Edelman et al., 2010; Housden, Wong, & Dawes, 2013; Taveira, Dooley, Cohen, Khatana, & Wu, 2011; Taveira et al., 2010). SMAs are a promising alternative to individual office visits because DSMES and peer support are integrated within the primary care visit, collaborative relationships between providers and patients can be nurtured, and group activities can be used to refine patients' disease management skills and enhance knowledge (Edelman, Gierisch, McDuffie, Oddone, & Williams, 2015).

Research on the effectiveness of SMAs to improve diabetes outcomes for Whites has emerged, and there is sufficient evidence on the effectiveness of SMAs on A1C and BP to support the implementation of SMAs among White adults with type 2 diabetes (Edelman et al., 2015; Housden et al., 2013). The impact of SMAs on A1C and BP is not only statistically significant, but also, more importantly, clinically significant. Two separate meta-analyses revealed that SMAs improved A1C by 0.6 percentage points, findings similar to another meta-analysis (Housden et al., 2013). Although a change of 0.6% may seem modest, given the United Kingdom Prospective Diabetes Study (UKPDS) findings, a decrease of 0.6% A1C translates to a decrease of approximately 10.5% deaths related to diabetes, 7% myocardial infarctions, and 19% microvascular complications (Stevens, Kothari, Adler, & Stratton, 2001). Edelman et al. also found a clinically significant decrease of 5 mmHg in systolic BP among SMA participants (Edelman et al., 2015; Housden et al., 2013). To provide context, a classic hypertension study found that after adding a first-line medication for hypertension treatment, the expected improvement after 1 year of treatment was approximately 6.6 mmHg (Piller et al., 2014). Edelman points out that SMA patients achieved 75% of the level of improvement seen with a first-line medication for hypertension (Edelman et al., 2015).

Unfortunately, research on SMA effectiveness has, for the most part, excluded monolingual Spanish-speaking Latinxs (Gutierrez, Gimple, Dallo, Foster, & Ohagi, 2011). The only study to focus on low-income, uninsured Latinxs was conducted by Gutierrez and colleagues (2011) in a randomized control trial (RCT) of 93 patients. Unfortunately, the authors did not state whether the participants were monolingual or bilingual or whether the SMA was culturally tailored. Findings revealed a mean A1C decrease of 1.19% in

the SMA group ($p < .01$) versus a decrease of 0.67% in the control group ($p < .02$). The paucity of research on Latinxs subpopulations and the paucity of interventions that are culturally tailored for Spanish-speaking Latinxs living with type 2 diabetes indicate a need to expand this research and develop the interventions.

Purpose

The purpose of this study was to evaluate the effectiveness of a nurse practitioner–led behavioral SMA intervention, referred to as "ALDEA" (*Latinxs con Diabetes en Acción*). In the study, a group of patients who participated in an SMA intervention was compared with a similar control group of patients who received usual primary care (UPC) for the treatment of type 2 diabetes; the study was conducted over a 6-month period at a Federally Qualified Community Health Center (FQHC). The cardiovascular risks measured were A1C, LDL, and systolic and diastolic BP. The primary outcome was A1C reduction. Secondary outcomes were LDL and BP. The study of the ALDEA SMA model, as an innovative model of care for predominantly Spanish-speaking Latinxs has the potential to identify a sustainable and evidence-based, culturally tailored model of care to reduce health disparities.

Method

Research Design

This study was a quasi-experimental design with a nonrandomized matched control group that followed participants prospectively for 6 months. The Institutional Review Board at the University of California, San Francisco, approved the study, including the protocol and consent forms. Study enrollment began on January 2015 and ended October 2016.

Setting and Sample

The recruitment of participants took place in a single FQHC in the California central coast serving people with low income. Inclusion criteria were Spanish-speaking Latinxs, older than18 years of age with type 2 diabetes, and must have attended at least three SMA sessions. Participants were referred by their primary care providers, recruited via flyers and phone calls using the diabetes registry at the FQHC.

The 30 participants who comprised the SMA intervention group were enrolled in two cohorts. The first cohort consisted of 18 participants and was

used to determine the effect size for the study. The second cohort consisted of 12 participants. A total of 55 eligible participants were approached to participate in the ALDEA SMA program and 40 chose to participate, for a 72% participation rate. Seventy percent of participants indicated that lack of child care was the primary reason for nonparticipation. Of the 40 people who chose to participate, 10 were excluded from the main analysis because they attended less than three SMAs, leaving an intervention group of 30.

The control group was a nonrandom, matched sample, which met the aforementioned inclusion criteria and received UPC at the FQHC clinic. Intervention and control group participants were individually matched by age, (within 5-10 years), and A1C levels (within 0.5%-1%). Each SMA participant was matched with their controls within the same time frame of the intervention so that baseline and follow-up data were consistent over time.

Based on results from the first cohort of this sample, it was hypothesized that the intervention groups' average change in A1C from baseline to 6 months would be 1.48% ($SD = 2.22\%$) and the control group would have no change in A1C. The difference between a mean (*SD*) of 1.48% (2.22%) change and no change can be expressed as an effect size of 0.667. Using the nQuery Advisor Power Program, to determine the sample size needed to compare, two unequal independent samples change scores to detect the effect size of 0.667 using a *t* test, 80% power, and a two-tailed alpha of .05. The results showed that the total sample size should be 84 (e.g., 28 intervention and 56 control group participants). Therefore, we enrolled 30 participants in the intervention group and 60 participants in the control group to have enough power to test our hypotheses.

Intervention: ALDEA SMAs

ALDEA is a culturally tailored SMA program, developed and implemented by the first author in the Spanish language at a single FQHC site (Castro, Barrera, & Holleran Steiker, 2010). The cultural adaptation consisted of ensuring a team of bilingual and bicultural providers. In addition, materials were adapted for low health literacy patients and activities were chosen based on cultural relevance. Please refer to Table 1 for a description of adaptive changes made to the model. The structure of the SMA intervention was based on the model refined by the Veterans Affairs Office (Taveira et al., 2011). In this model, groups include peer support, DSMES with a focus on behavioral approaches (SMART goals and problem solving), and medical management. SMART goals are specific, measurable, agreed upon, realistic and time-based. The ALDEA SMA program team consisted of a lead family nurse practitioner (FNP), an FNP student, a medical assistant, and a volunteer

Table 1. Cultural Adaptation of ALDEA Shared Medical Appointment Model.

	Issues to Consider	Adaptation
Social determinants	Low SES/insurance status	Low-cost pharmacy Low-cost/free diabetes supplies
	LHL	Screening for LHL included in intake form Food distribution established on-site
	Language barriers	Bicultural and bilingual team
Cultural considerations	*Respeto*	Cultural humility training for bicultural and bilingual team
	Familismo	Family members invited to participate Consideration of family in planning and execution of SMART goals
	Time orientation	Flexible schedule, late arrival normalized
	Herbal medicine	Use of herbal medicine integrated into intake form

Note. SES = socioeconomic status; LHL = low health literacy.

registered nurse. Patients continued to access their primary care provider, at the same FQHC clinic, for routine care.

The ALDEA SMA program had an open enrollment policy, where participants could join at any given time, and groups were limited to 12 patients per group. The SMA intervention was offered once a week for 2 hr on an ongoing basis. During the first year of the SMA group meetings, only a morning group was offered. An evening group was added in the second year. In the second year, participants had the choice to attend the morning or evening sessions. There were a total of approximately 24 SMA sessions during the first 6 months of the program for each cohort.

Procedures

Intervention group: SMA sessions. The SMA sessions used a group process to provide support, education, and patient activation. Motivational interviewing (MI; Miller & Rollnick, 2012) and group processes were used to promote collaborative goal setting and problem solving in the form of individual action plans and were integrated into individual visits/check-ins as well as group activities. The individual component included the following: patient

registration, vital signs, medication reconciliation, and individual assessment of diabetes management (laboratory findings, orders, medication refills, medication titration, review of SMART goals and action plans, and referrals).

The content of the SMA sessions was participant-driven. Participants decided every week what content and activities they wished to engage in the following week. Activities included, but were not limited to, didactic sessions, hands-on experiential learning, exercise, group discussions, recipe sharing and cooking activities. SMA visits included a brief individual medical evaluation during which the medical provider reviewed and revised SMART goals in collaboration with each participant. During this time, the provider engaged in problem solving as necessary to explore barriers and define new goals. Similarly, during group education, interaction, or activities, the group engaged in problem-solving in relation to their treatment barriers and the topic being discussed, and supported each other in goal setting. In addition, medical care was coordinated with primary care services delivered by a different PCP within the FQHC.

The current literature on structural barriers among low-income Latinxs has identified the following factors to be considered in the implementation of diabetes health interventions; lack of health insurance, low health literacy, food insecurity, limited diabetes knowledge, language barriers and low acculturation levels (Olson, Sabogal, & Perez, 2008). The cultural adaptation of the ALDEA SMA model consisted of a professional team of bilingual and bicultural providers. In addition, materials were adapted for low health literacy patients and activities were chosen based on cultural relevance. In an attempt to lessen the burden of food insecurity and lack of health insurance resources, policies were implemented at the FQHC at large (Table 1).

UPC group. The UPC group participants received the clinic's standard of care for persons with diabetes. Standard of care consisted of quarterly individual clinic visits with a primary care provider (i.e., MD, FNP, or PA) of approximately 20 min. Referrals to DSMES in the community were made routinely as part of standard of care. There were no dieticians or diabetes educators available onsite.

Measures

Demographic variables were obtained from the medical records of intervention and control group participants, as were laboratory values of A1C, systolic and diastolic BP, and LDL. The data were extracted from a clinic-based diabetes registry system. This data system was created and verified by two data analysts, thus increasing the accuracy and reliability of the data.

Demographic variables. The following demographic data were collected at baseline: chronological age (in years), sex, ethnicity, number of diagnosed chronic diseases, poverty level (defined per federal guidelines), and health insurance (yes or no for any type of comprehensive insurance, public or private payer).

Outcome variables. The study had three outcome variables: hemoglobin A1C, LDL, and BP.

Hemoglobin A1C. The primary outcome, A1C, was measured with a high-performance liquid chromatography method used by the Bio-Rad Hercules laboratory. Data were obtained at baseline and at 3 and 6 months. If a participant had more than one measurement in a 90-day interval, the average of all A1C levels collected during the interval was used. Hemoglobin A1C levels obtained within 24 hr of the first SMA appointment were considered to be pre-SMA baseline data. Post-SMA data points were calculated as time from first SMA appointment. Data from all participants were then aggregated based upon corresponding time intervals every 3 months. Quarterly measures of A1C are part of the ADA guidelines of care for people with diabetes and were routinely collected in this clinic.

LDL. The value of the last LDL, closest to the 6-month post-intervention data collection point, was utilized. Per current guidelines, the LDL variable was dichotomized (yes/no) as to whether the participant achieved the recommendation of less than 100 mg/dL (Cornell, 2017).

BP. Both systolic (SBP) and diastolic blood pressure (DBP) were measured using calibrated manual cuffs, taken by a medical assistant or nurse practitioner student at each clinic or SMA visit. The BP values closest to the 6-month time, post-baseline data collection, was used for analysis. Per current guidelines, the BP variable was dichotomized (yes/no) as whether the participant achieved the recommendation of less than 140/90 (Cornell, 2017).

Data Analysis

Data entry and statistical analyses were conducted using SPSS 19. Descriptive statistics were used to summarize the data and identify outliers. Differences in the demographics and study variables between the intervention group and the control group were calculated using Student's t test for independent groups, chi-square or Fisher exact tests. A1C was compared by group, at baseline, 3 months, and 6 months. Differences in the percentage of

participants in each group who achieved A1C, LDL, BP, and all three target goals, per the ADA guidelines (A1C <7% or <8% for patients with multiple comorbidities or increased risk hypoglycemia, LDL < 100 mg/dl, BP < 140/90 mmHg), were compared at 6 months (ADA, 2019). These variables were dichotomized and coded as on target (1) and not on target (0). Chi-square analyses were used to evaluate the difference in the percent of participants reaching target goals for each outcome variable (A1C, LDL and BP). Finally, to evaluate the impact of the subjects who left the study, differences in baseline demographics and A1C were compared between participants with complete versus missing data.

To test the effect of group membership on A1C change, differences in change scores were compared between the ALDEA SMA intervention group and the UPC. Change scores were operationalized as the reduction in A1C at 3 months (3 months minus baseline) and reduction at 6 months (6 months minus baseline). Two sets of analyses were carried out. First, as intent to treat analysis, which included all 40 SMA participants regardless of number of sessions attended. The second analysis included the 30 participants who met the attendance inclusion criteria of three SMA sessions. For both, linear regression analysis was computed to assess if mean A1C change from baseline to 3 and 6 months was greater among SMA intervention group participants compared with the UPC control group participants, with baseline A1C as a covariate in the model.

Results

There were a total of 24 SMA sessions during the first 6 months of the program for both intervention cohorts. Each session included a mean of seven participants, who attended a mean of 13 and a median of seven SMA sessions.

The mean age of the sample was 53 years ± 12.3 years. The majority of the participants were at or below the Federal Poverty Line. In the sample, 61% had health insurance and participants had an average of 2.4 ± 1.4 chronic conditions per medical records. There were no significant differences at baseline between ALDEA SMA intervention cohorts 1 and 2 in terms of age ($p = .35$), poverty level ($p = .54$), number of chronic conditions ($p = .43$), or insurance status ($p = .33$). Consequently, intervention cohorts 1 and 2 were combined for the remaining of the analyses. There were no statistically significant differences on demographic variables or baseline A1C between those with complete or missing data.

At baseline, there were no statistically significant differences in age ($p = .32$), sex ($p = .39$), poverty ($p = .18$), health insurance status ($p = .35$), and

Table 2. Demographic Characteristics of Study Participants.

	ALDEA SMA (n = 30)		Control (n = 60)		
Demographic Characteristic	*M*	*SD*	*M*	*SD*	*p*
Age (years)	54.87	12.7	51.85	12.1	.32
Poverty level	83.70	53.9	109.00	124.7	.18
Number of chronic conditions	2.41	1.8	2.31	1.1	.69

SMA = shared medical appointment.

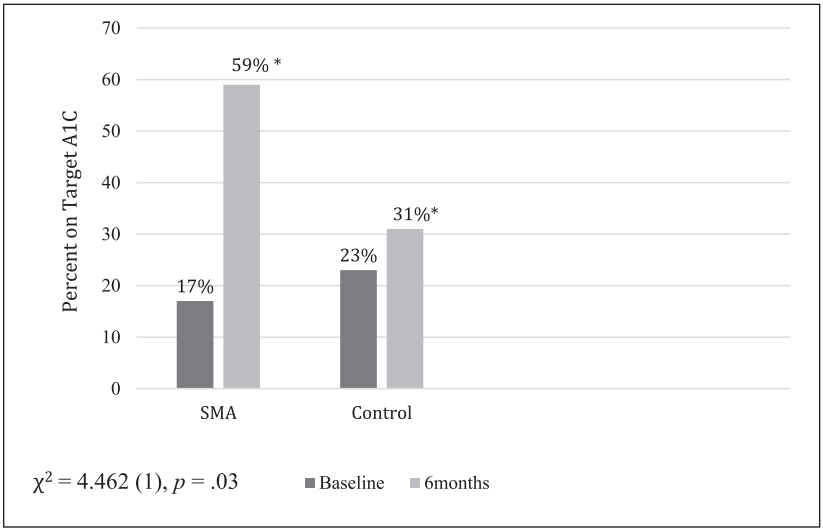

Figure 1. Percent of participants on Target A1C at baseline and 6 months.

comorbidities (p = .69) between the ALDEA SMA intervention group and the matched UPC control group (Table 2).

A1C. There were no statistically significant differences in mean A1C values at baseline, 3 month or 6 months between ALDEA SMA and UPC participants (Table 3). There was a statistically significant difference in the percentage of participants who achieved the target A1C goal at 6 months post-intervention for the SMA participants (58.6% versus the control group participants, 31%; $\chi^2(1) = 4.462$, p = .03; Figure 1).

There was a statistically significant change in A1C for the intervention versus control participants at 6 months, $F(2, 50) = 28.16$, p = .00, but not at 3 months post-SMA intervention, $F(2, 55) = 31.92$, p = .00 (Table 4. There

Table 3. Clinical Characteristics of Study Participants.

Clinical Parameters	ALDEA SMA ($n = 30$)		Control ($n = 60$)		
	M	*SD*	*M*	*SD*	*p*
A1C, baseline	9.97	2.43	9.44	2.06	.25
A1C, Month 3	8.52	1.69	8.71	1.70	.48
A1C, Month 6	8.01	1.46	8.72	1.71	.10

Note. SMA = shared medical appointment.

Table 4. Changes in A1C at 3 Months and 6 Months: SMA Participants Versus Control Participants (Controlling for Baseline A1C).

SMA Predicting A1C Change[a]	*n*	Unstandardized β	*SE* β	*t* Statistic	*p*	Model Statistics
At 3 months	57	−0.55	−0.37	−1.48	.14	$F(2, 55) = 31.92$, $p = .00$
At 6 months	52	−0.83	0.37	−2.25	.03[a]	$F(2, 50) = 28.16$, $p = .00$[a]

Note. Intervention (SMA = 1, Control = 0). A1C = Hemoglobin A1C; SMA = shared medical appointment.
a. Change is defined as A1C at 3 months or at 6 months minus baseline A1C.

was a reduction of A1C by 0.55% ($b = -0.55$, $t = -1.48$, $p = .14$) from baseline to 3 months and a reduction of 0.83% ($b = -0.83$, $t = -2.25$, $p = .03$) from baseline to 6 months, in favor of the SMA participants. Intent-to-treat analysis revealed that the reductions of A1C were greater in the intervention group at 6 months ($b = -0.81$, $t = -2.46$, $p = .02$), but not at 3 months ($b = -0.52$, $t = -1.63$, $p = .11$).

The majority of the participants in the intervention group (90%) and in the control group (89%) had on-target BP values at 6 months, $\chi^2(df) = 0.045(1)$, $p = .832$. Sixty-five percent of SMA participants compared with 50% of control group participants had on-target LDL values at 6 months, $\chi^2(df) = 1.66(1)$, $p = .11$. Finally, although not statistically significant, it is of clinical significance to note that 32% of intervention group participants compared with 15% of control group participants achieved the on-target goals for all three criteria, A1C, LDL, and BP; $\chi^2(df) = 2.83(1)$, $p = .24$.

Discussion

To our knowledge, this study with a matched control group is among the first to document the impact of a culturally adapted SMA model to improve

glycemic control among low-income, Spanish-speaking Latinxs living with type 2 diabetes. This study demonstrated that underserved Latinxs enrolled in the ALDEA program, a culturally sensitive, community-based, nurse practitioner–led, SMA model, was able to achieve A1C goals in greater numbers compared with those who received UPC. Furthermore, the ALDEA SMA intervention led to a net reduction of −0.55% at 3 months, and a statistically significant net reduction of −0.83% at 6 months in A1C compared with UPC participants. These differences are also clinically significant and mirror the outcomes in other studies of SMA effectiveness in reducing A1C. Edelman and colleagues reported in their meta-analysis a net reduction of 0.6% in A1C in favor of SMA Edelman et al., 2015. The clinical significance is contextualized by the the UKPDS, which found that a 1% decrease in A1C values translated to a 14% decrease in macrovascular diseases, a 37% decrease in microvascular complications and a 21% decrease risk of deaths related to diabetes (Stevens et al., 2001).

The prevalence of adults with type 2 diabetes that meet the A1C, BP, and LDL recommendations in the United States vary by ethnicity (Stark Casagrande et al., 2013). Stark and colleagues analyzed NHANES (National Health and Nutrition Examination Survey) data and noted that Mexican Americans were less likely than their White counterparts to meet A1C and LDL goals, 46% versus 52% and 45% versus 62% respectively (Stark Casagrande et al., 2013). The ALDEA SMA participants demonstrated a higher percentage of achieving recommended goals compared with the UPC participants for A1C (58.6% vs. 31%), BP (90% vs. 85%), and LDL (65.4% vs. 50%) and 32% of the ALDEA SMA group versus 15% of the UPC group met all three criteria. Thus, ALDEA SMA participants achieved overall goals well above national trends both for Latinxs and for the NHANES sample, suggesting the importance and relevance of culturally tailoring an intervention, such as ALDEA SMA, that is culturally specific.

Although these are novel findings, there were limitations to the study. The lack of a randomized control group can lead to selection bias. Self-selection in the ALDEA SMA program may have favorably influenced the results. Patients who chose to participate in the SMA group may have already been motivated to improve their health. In addition, while the authors attempted to equalize characteristics of participants in the SMA and control groups in this quasi-experimental design, the groups may still differ in ways not accounted by the matching procedure. Unfortunately, there were restrictions to the study design and randomization was not an option in this community setting as the SMA ALDEA program had been initiated prior to the study. Non-withstanding, and considering the study was underpowered, evidence of this model provides the foundation for designing a more rigorous, prospective randomized trial in the future.

Another possible threat to internal validity was that of possible design contamination. The treatment and control groups were from the same clinic and the medical providers may have influenced each other in some way. For example, implementation of the ALDEA SMA program might have influenced primary care providers and influenced them to inadvertently change the medical care of control participants. This bias could have underestimated the outcomes found in the study.

This intervention was implemented at a single site with a relatively homogeneous population of low-income, Spanish-speaking Latinxs from Central America and Mexico. Although this affects the generalizability of the findings, the importance of including this population in research cannot be understated given the higher prevalence of diabetes and the disparity in diabetes outcomes experienced by this population. Future studies should assess the feasibility and efficacy of the ALDEA SMA intervention in different settings, with different populations, with varied degrees of acculturation, and employing a different team composition.

Future research on the effectiveness of SMA as a model of care for Latinxs should attempt to close some of the gaps in the literature. In particular, comparative effectiveness studies are necessary to identify which components of the SMA might be responsible for the change and the optimal intervention dose. Researchers should attempt to use standardized instruments across studies that will allow for meta-analysis, and include not only biophysical measures, but also patient-centered outcomes such as self-efficacy, quality of life, and patient activation/engagement.

It is important to note that unlike other SMA teams described in the literature, which often included multiple licensed professionals (i.e., pharmacist, medical doctors, psychologists), this team was small and included a nurse practitioner, nurse practitioner students, a volunteer nurse, and a medical assistant. This team approach may be a cost-effective way to reach the most vulnerable and low resourced populations.

In conclusion, given the disproportionate rates of type 2 diabetes and poor outcomes among low socioeconomic status Latinxs in the United States, it is important that research studies include this vulnerable population. To date, there has been only one RCT evaluating the effectiveness of SMA with Latinxs (Gutierrez et al., 2011). This study is the first, to our knowledge, to document the effect of a culturally tailored SMA program with low income, underserved Spanish-speaking Latinxs lead by a nurse practitioner that showed a significant decrease in A1C at 6 months post-intervention.

Despite its limitations, the ALDEA SMA program has been successful in engaging Latino patients and improving glycemic control; its innovation could be disseminated and tested in other settings, populations, and health

conditions. The ALDEA SMA model has the potential to reach underserved communities and result in significant improvements in the health status among the most vulnerable populations.

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References

American Diabetes Association. (2019). Standards of medical care in diabetes—2019. Abridged for primary care providers. *Clinical Diabetes*, *37*(1), 11-34. doi:10.2337/cd16-0067

Brown, S. A., & Hanis, C. L. (2014). Lessons learned from 20 years of diabetes self-management research with Mexican Americans in Starr County, Texas. *The Diabetes Educator*, *40*, 476-487. doi:10.1177/0145721714531336

Castro, F. G., Barrera, M., Jr., & Holleran Steiker, L. K. (2010). Issues and challenges in the design of culturally adapted evidence-based interventions. *Annual Review of Clinical Psychology*, *6*, 213-239. doi:10.1146/annurev-clinpsy-033109-132032

Centers for Disease Control and Prevention. (2017). *National diabetes statistics report, 2017*. Atlanta, GA: Centers for Disease Control and Prevention, U.S. Department of Health and Human Services. Retrieved from https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf

Cohen, L. B., Taveira, T. H., Khatana, S. A., Dooley, A. G., Pirraglia, P. A., & Wu, W. C. (2011). Pharmacist-led shared medical appointments for multiple cardiovascular risk reduction in patients with type 2 diabetes. *The Diabetes Educator*, *37*, 801-812. doi:10.1177/0145721711423980

Coleman, K., Austin, B. T., Brach, C., & Wagner, E. H. (2009). Evidence on the chronic care model in the new millennium. *Health Affairs*, *28*(1), 75-85. doi:10.1377/hlthaff.28.1.75

Cornell, S. (2017). Comparison of the diabetes guidelines from the ADA/EASD and the AACE/ACE. *Journal of the American Pharmacists Association*, *57*, 261-265. doi:10.1016/j.japh.2016.11.005

Edelman, D., Fredrickson, S. K., Melnyk, S. D., Coffman, C. J., Jeffreys, A. S., Datta, S., & Weinberger, M. (2010). Medical clinics versus usual care for patients with both diabetes and hypertension: A randomized trial. *Annals of Internal Medicine*, *152*, 689-696. doi:10.7326/0003-4819-152-11-201006010-00001

Edelman, D., Gierisch, J. M., McDuffie, J. R., Oddone, E., & Williams, J. W., Jr. (2015). Shared medical appointments for patients with diabetes mellitus: A systematic review. *Journal of General Internal Medicine*, *30*, 99-106. doi:10.1007/s11606-014-2978-7

Gutierrez, N., Gimple, N. E., Dallo, F. J., Foster, B. M., & Ohagi, E. J. (2011). Shared medical appointments in a residency clinic: An exploratory study among Hispanics with diabetes. *The American Journal of Managed Care*, *17*(6), e212-e214.

Housden, L., Wong, S. T., & Dawes, M. (2013). Effectiveness of group medical visits for improving diabetes care: A systematic review and meta-analysis. *Canadian Medical Association Journal*, *185*, E635-E644. doi:10.1503/cmaj.130053

Miller, W. R., & Rollnick, S. (2012). *Motivational interviewing: Helping people change* (3rd ed.). New York, NY: Guilford.

Olson, R., Sabogal, F., & Perez, A. (2008). Viva la vida: Helping Latino Medicare beneficiaries with diabetes live their lives to the fullest. *American Journal of Public Health*, *98*, 205-208. doi:10.2105/ajph.2006.106062

Piller, L. B., Simpson, L. M., Baraniuk, S., Habib, G. B., Rahman, M., Basile, J. N., . . . Davis, B. R. (2014). Characteristics and long-term follow-up of participants with peripheral arterial disease during ALLHAT. *Journal of General Internal Medicine*, *29*, 1475-1483. doi:10.1007/s11606-014-2947-1

Stark Casagrande, S., Fradkin, J. E., Saydah, S. H., Rust, K. F., & Cowie, C. C. (2013). The prevalence of meeting A1C, blood pressure, and LDL goals among people with diabetes, 1988–2010. *Diabetes Care*, *36*, 2271-2279. doi:10.2337/dc12-2258

Stevens, R. J., Kothari, V., Adler, A. I., & Stratton, I. M. (2001). The UKPDS risk engine: A model for the risk of coronary heart disease in type II diabetes (UKPDS 56). *Clinical Science*, *101*, 671-679.

Taveira, T. H., Dooley, A. G., Cohen, L. B., Khatana, S. A., & Wu, W. C. (2011). Pharmacist-led group medical appointments for the management of type 2 diabetes with comorbid depression in older adults. *Annals of Pharmacotherapy*, *45*, 1346-1355. doi:10.1345/aph.1Q212

Taveira, T. H., Friedmann, P. D., Cohen, L. B., Dooley, A. G., Khatana, S. A., Pirraglia, P. A., & Wu, W. C. (2010). Pharmacist-led group medical appointment model in type 2 diabetes. *The Diabetes Educator*, *36*, 109-117. doi:10.1177/0145721709352383

Wagner, E. H., Austin, B. T., Davis, C., Hindmarsh, M., Schaefer, J., & Bonomi, A. (2001). Improving chronic illness care: Translating evidence into action. *Health Affairs*, *20*(6), 64-78.