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## ***A culturally sensitive tool for Mexican people with diabetes: "La Manzana de la Salud".***

**Original Article**

Arturo Jiménez-Cruz<sup>1</sup>, Montserrat Bacardí-Gascón<sup>1</sup>, Perla Rosales-Garay<sup>1</sup>, Joaquín Herrera-Espinoza<sup>1,2</sup>, Willis O. Willis<sup>3</sup>.

<sup>1</sup>Universidad Autónoma de Baja California, <sup>2</sup>Instituto Mexicano del Seguro Social, Baja California, México, <sup>3</sup>School of Public Health, San Diego State University, California, USA.

### **SUMMARY.**

**Background.** A lack of communication between the patient and the health care provider has been reported in diabetes education programs. These difficulties may be more pronounced when patients and health providers have dissimilar cultural and ethnic backgrounds. The objective of the diabetes program "Si se puede", is to improve the metabolic control of Mexicans with diabetes in the border region.

**Methods.** The program stresses dietary monitoring. "La Manzana de la Salud", is the dietary tool used for empowerment and to promote physical activity. One hundred Mexican and Mexican-Americans with diabetes from San Diego and Tijuana participated in the program. Sessions included glucose self-monitoring, diet and diet scoring, physical activity and introduction to the Apple of Health (La Manzana de la Salud) model as a tool to follow the dietary and nutritional recommendations for diabetics. Fasting venous blood samples were taken at the beginning and end of the program and were analyzed for glucose and glycosylated hemoglobin.

**Results.** Our findings show that after seven weekly

sessions, there was a statistically significant improvement in metabolic control and diet score.

**Conclusions.** Overall, the qualitative and quantitative evaluations show that the program achieved a high level of acceptance by patients and health care providers. Most importantly, the program resulted in a statistically significant difference in blood glucose monitoring and a higher level of patient satisfaction with the program from pre to post-intervention. We suggest the need for support of culturally sensitive intervention programs, using culturally validated tools, and trained health promoters.

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**Key words:** Type 2 Diabetes, Education Program, US-Mexico Border Health.

### **RESUMEN.**

**Un instrumento adaptado a la cultura de mexicanos con diabetes: "La Manzana de la Salud"**

**Antecedentes.** En los programas de educación para el diabético se ha descrito falta de comunicación entre

Corresponding address: Arturo Jiménez-Cruz, 2399 Eastridge Loop, Chula Vista, CA 91915, USA

E-mail: [ajimenez@costa.tj.uabc.mx](mailto:ajimenez@costa.tj.uabc.mx).

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el paciente y los proveedores de salud. Estas dificultades pueden ser más pronunciadas cuando existe antecedentes culturales y étnicos diferentes. El objetivo del programa para diabéticos “Si se puede”, es mejorar el control metabólico de mexicanos con diabetes de la región fronteriza.

**Métodos.** El programa le da prioridad a la dieta y la monitorización de la dieta. La Manzana de la salud es el instrumento empleado para desarrollar educación dietética y promover la actividad física. Cien mexicanos con diabetes residentes en San Diego y en Tijuana participaron en el programa. Las sesiones incluyeron prácticas de automonitorización de la glucosa, dieta, registro de dieta, actividad física y la utilización del modelo de la “ Manzana de la Salud “ (Apple of Health), como instrumento para el aprendizaje de la dieta y el cumplimiento de las recomendaciones nutricionales para diabéticos. Para valorar el efecto sobre el control metabólico del programa se realizaron muestras sanguíneas para glucosa en ayunas, colesterol, triglicéridos y hemoglobina glucosilada.

**Resultados.** Después de siete sesiones semanales, se observó diferencia estadísticamente significativa en indicadores de control metabólico y en la calificación de la dieta.

**Conclusiones.** Las evaluaciones cuantitativas y cualitativas demuestran que el programa logró un alto nivel de aceptación, tanto por los pacientes como por los proveedores de salud. Hubo mejoría estadísticamente significativa de la monitorización de la glucosa y el alto nivel de satisfacción cuando se compararon los resultados pre y post intervención. Se sugiere el apoyo a intervenciones adaptadas a la cultura de los pacientes, utilizando instrumentos validados en cada grupo y mediante el entrenamiento de promotores de salud.

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**Palabras clave:** Diabetes tipo 2, programa de educación, Frontera México-Estados Unidos.

## INTRODUCTION.

The increase in the incidence of diabetes, its health implications and the associated economic costs

highlights the need to improve health care for people with diabetes in low-income populations. Previous research (1,2) has indicated that tight metabolic control of diabetic patients will prevent the appearance of long-term complications of diabetes. The Diabetes Control and Complications Trial showed that achieving and maintaining near normal glycemia, which would manifest as a 50 to 60 percent reduction in diabetes complications, may require close monitoring and ongoing support from a health care team, ample financial resources, and advanced patient knowledge and motivation (1,2). Several medical practices have been recommended to achieve this level of control (1-3).

The incidence and prevalence of diabetes mellitus in the Mexican-American population is greater than among Anglos and African-Americans (4-7). However, according to, the National Institutes of Health the prevalence of diabetes in African-Americans (9.6%) is similar to that of Mexican Americans, while White Americans have the lowest prevalence at 6.2% (8). The American Diabetes Association estimated that there were 220,000 diabetics in San Diego in 1995. In San Diego, the incidence of people with diabetes among Blacks, Hispanics and Native Americans is 300% higher than among whites. Hospital charges in diabetes, generated for San Diego and Imperial counties during 1992-1993, totaled 8.3 million dollars at a cost per case of \$6,608 (9). This group has the highest prevalence of diabetes mellitus, the highest prevalence of obesity, and fewer numbers of insured people in the population. Additionally, Mexican Americans in the San Diego region have less healthy food habits, and relatively little concern about losing weight (10).

According to Anderson *et al.* (11), potential barriers to health care for ethnic minorities with diabetes include a lack of knowledge about their condition due to culturally insensitive patient education, fatalistic health beliefs, such as lack of control of their own health care, or a helpless attitude, lack of access to health care, especially due to lack of medical insurance, differing cultural values and priorities, racism and a high prevalence of poverty. Some traditional diabetes

education programs have had a lack of communication between the patient and the health care provider. This barrier causes difficulty with adherence to dietary goals and strategies. Dissimilar cultural and ethnic backgrounds of patients and health providers have also been identified as a barrier. When that is the case, it is even more important for health care providers to maintain open and interactive communication to effect optimal adherence (6,12). Materials and tools used to motivate patients to meet the diabetes guidelines should be cultural sensitive in order to increase effectiveness.

Hall (13) stated that culturally sensitive health educators who respect cultural differences and values could also address this barrier. Furthermore, programs and educational materials should be designed so that they are relevant to the cultural background of the patient. Considering language, ethnic food habits, folk beliefs and values all factors which influence the patient's ability and willingness to change. Incorporating these unique features into the intervention as a complementary component that enhances the confidence and communication of the patient improves the education experience (13). Weinberger *et al* (14), advocate for professional support beyond that provided by the patient's physicians to achieve successful metabolic control through improved instruction and emotional support for patients and their families.

Practices such as self-diagnosis, self-medication, and seeking medical consultation with a pharmacist are common in Latin America. Therefore, different experts have suggested that efforts to improve diabetes care to Hispanic populations should include the dissemination of current practice recommendations with particular emphasis on developing implementation strategies that are culturally sensitive.

Little attention has been given to describing the level of metabolic control in Mexican-American with diabetes in primary care settings. "Si se puede", addresses this issue in the San Diego and Tijuana border region. The Si se puede program stresses dietary monitoring, glucose self-monitoring, self-empowerment and physical activity.

## **METHODOLOGY.**

**Program Description.** The recruitment and interview part of the data collection was conducted over a period of 20 months, from July 1998, to February 2000. One hundred volunteer Mexicans and Mexican-Americans with type 2 diabetes from primary care clinics in San Diego, California and Tijuana, Mexico, participated in the intervention. All the people with diabetes in care in two San Diego area clinics and two Tijuana, Mexico clinics were contacted, informed about the intervention and asked to participate in the intervention. An incentive was offered for attendance at the sessions. Human Subjects Committee granted approval for the research.

**Subject Recruitment.** In the San Diego area clinics, potential participants were contacted by phone for the recruitment contact. In Tijuana, they were contacted in the clinic waiting room and referred by family physicians. The consent approved to an interview and to abstraction of the patients medical record. The following were the criteria for inclusion in the medical record review: a) male and female, b) diagnosis of type 2 diabetes. The criteria for exclusion were: a) pregnant women, b) patients on dialysis and c) those patients with limited or absent capabilities to provide informed consent. Research assistants described the intervention and obtained a signed consent from those who agreed to participate. The participants were also informed of the procedures for maintaining contact the co-principal investigator (AJ).

**Culture-Based Educational (Empowerment) Intervention.** Diabetes self-management (self-empowerment) is a relatively new approach to improving the prevention and control of diabetes thereby preventing its complications. This approach acknowledges that people with diabetes must ultimately take responsibility for the day-to-day management of their disease. This program focused on developing the needed skills to make and sustain behavioral changes that contribute to improved prevention and control. The participants attended seven sessions every week over a 2-month period in-groups of ten to fifteen. In addition, participants attended reinforcement sessions every two weeks or

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every month, as necessary. The facilitators were all (2) Spanish speaking professionals and culturally aware of the Mexican health care at the three Mexican care settings as well as the traditional health care.

The program had the five main steps:

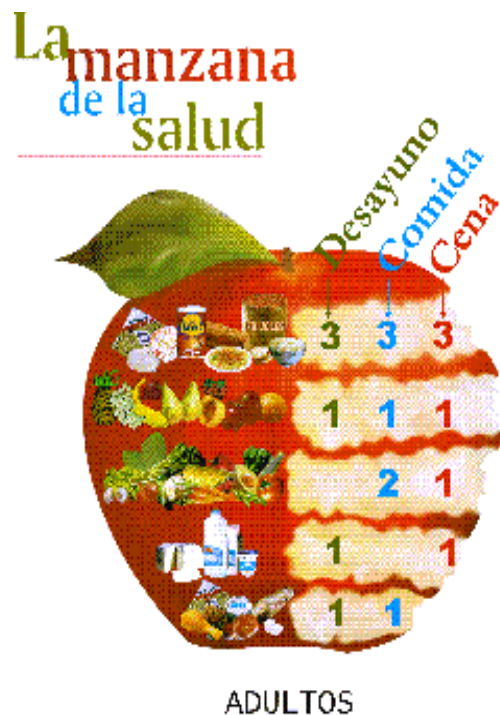
1. The first step of the intervention program included discussions held for each group of eight to ten patients in order to identify health care experiences, personal adherence to regimens, and identification of their met and unmet needs. This information was used to tailor the educational intervention and make it more relevant and responsive.
2. The second step helped them develop the skills needed to achieve glycemic control through dietary change and glucose self-monitoring. Participants were trained to test their blood glucose at the clinic at least five times a week. They were encouraged to check the blood glucose at least once a day before any of the three main meals. The weekly average blood glucose includes all of them.
3. The third step was nutrition educational using a

cultural validated tool: The Apple of Health. The Apple of Health (figure 1) is a food guide developed and validated by the Nutrition Institute of Baja California (15-18). It uses the same food groups as the USDA Food Pyramid. However, the apple of health includes beans in two groups; grains and meat products. Beans are one of the main staple foods consumed, and are included in two groups because Mexicans usually classified them as grain products, besides, beans are first to second sources of protein in the middle and low income classes. The apple of health graphic also includes the labeling of the three main meals and the recommended number of portions per meal according to the eating style of people in the Tijuana region (18).

4. The fourth step was the promotion of physical activity, at least 30 minutes walking everyday was recommended as a tool to achieved better metabolic control (3). However, physical activity was not monitored.

5. The fifth step include training the patients to be aware of the biochemical indicators of the metabolic control, the recommended frequency of examination and the need of requesting their health care provider the examination that follows the American Diabetic Association guidelines for metabolic control of diabetes (3). Besides, participants received outlets including the portions of each food group with food designs of the most frequently consumed foods for Mexicans, promoting physical activity and glucose monitoring, and including a range of biochemical indicators of metabolic control of diabetes and the frequency of physical and biochemical examinations recommended for people with diabetes.

The main theme throughout the intervention process has been the continuous reinforcement of these messages and encouragement to practice recommended preventive health behaviors. To maintain the participation of the patients, students provided follow-up by contacting them by phone or home visit every other week. In addition, the intervention program encouraged the involvement of family and extended family members; either by assisting at the session meeting or by practicing the health behavior conducts as a mean to prevent health



**Figure 1.-** The apple of health.

problems.

Beginning with the first discussion group at each clinic, the topics of major interest and suggestions of the group were gathered. These suggestions became the basis of the sequence and content of each subsequent session. Most groups started with glucose self-monitoring, dietary issues and the diet score. Physical activity and the diabetes guidelines were gradually introduced into the sessions. All the participants that agreed to the complete interview and the record abstraction participated at the intervention. Fifty percent of all the people with diabetes contacted in the San Diego region and eighty percent in the Tijuana region agreed to participate. Two complete packages of program material were designed to accommodate food habits and other cultural values.

The program was called "Si se puede". The Apple of Health model (figure 1) was presented at the first session and participants that were familiar with the food pyramid were asked to compare and discuss the advantages and disadvantages of each guide. They were encouraged to address their feelings about their ability to follow the dietary recommendations, especially concerns and barriers. The participants used a food frequency questionnaire and the diet score at each session. The participant compared the results of self-scoring their dietary intake and the weekly average glucose levels.

**Diet Score.** The diet score rated the consumption of six food groups according to number of meals consumed daily and how they met the recommended guidelines of the Apple of Health. Consumption of six to twelve portions of grains was rated as two, consumption of less than 6 was rated as 0; consumption of two to four portions of fruit was rated as two, consumption of less than 2 was rated as 0, consumption of three to five portions of vegetables was rated as 2, less than three was rated as 0, consumption of two to three portions of milk products was rated as 2, consumption of less than 2 and/or more than three was rated as 0, consumption of 2 to 3 portions of meat and meat derivatives was rated as 2, consumption of less than 2 or more than 3 portions was rated as 0, and consumption of three to six meals

a day was rated as 2 and consumption of less than 3 meals a day was rated as 0; the consumption of five or less portions of fat was rated as 2 and the consumption of more than five was rated as 0. The addition of all the above totaled 14 points as its maximum.

**The Follow-up Re-enforcement Strategy.** The follow-up program was an approach to maintenance of the lessons learned in the seven-week interventions, self-glucose monitoring, and the use of food models to design a sample diet. Participants who had not achieved metabolic control were continually reinforced, were given a pre-designed diet to meet their nutritional recommendations and needs.

**Metabolic indicators.** Fasting blood samples were taken at the beginning and end of each study period and were analyzed for glucose and glycosylated hemoglobin. For the quantitative determination of glucose in serum, the glucose oxidase procedure based on a modified Trindler method was used. HbA1c was measured on whole blood with an ion-exchange high-performance liquid chromatography method (Eagle Diagnostics, Desoto, Texas).

**Data Analysis Plan:** Data was analyzed using the SPSS software. A change in participant self-monitoring, behavior and glycemic levels was analyzed using descriptive and bi-variate analysis. Participants were also divided in two groups according to blood glucose monitoring (BGM) during the first week: Group A, with lower than 140mg/dL and Group B, with equal or higher than 140mg/dL. For each group, Pair t-test were used to compared pre and post-intervention mean BGM and diet score.

## RESULTS.

Of the original 100 subjects, thirteen were eliminated from the final analysis because they lacked complete information for the following reasons: four subjects discontinued participation in the study because of conflicts with work schedule, four subjects discontinued the study due to conflicts in personal schedule, and five subjects dropped out of the study because they did not wish to continue on an experimental study. One participant at each clinic

**Table 1**  
Participant Characteristics.

	Total			Men			Women		
	N	Mean	Range	N	Mean	Range	N	Mean	Range
Age (years)	100	54	(26-79)	28	55.0	(28-70)	72	53.0	(26-79)
Years with Diabetes	100	8.6	(1-32)	28	8.2	(1-32)	72	8.7	(1-26)
BMI (kg/m <sup>2</sup> ) <sup>a</sup>	100	30	(22.1-45.0)	28	27.4	(22.1-45)	72	30.7	(22.6-42.2)
HbA1c <sup>b</sup>	100	11.3	(6.3-15)	28	12.2	(6.3-15)	72	11.1	(7.4-14)
Diet Score	100	5.4	(1-10)	28	5.8	(1-10)	72	5.35	(3-12)
Glucose <sup>c</sup>	100	183	(70-307)	28	164.4	(70-307)	72	188.8	(99-303)

a. BMI = Body mass index.

b. HbA1c, glycosilated hemoglobin.

c. Glucose, weekly average blood glucose.

was not able to perform the glucose self-monitoring because of lack of confidence, fear and illiteracy. A member of their family helped them. Therefore, complete information was available on twenty men and sixty-seven women for a study number of eighty-seven; twenty-four were from the San Diego clinics and sixty-three were from the Tijuana clinics.

Mean age for the group was 54±11 years (range=26 to 79 years), mean total time of exposure to the interventions was 420 minutes over 7 weeks. table 1 show the participant characteristics, and table 2 provides mean values for pre-intervention and post-intervention average glucose, glycosylated hemoglobin, diet score and percent changes for the entire group. In table 3 is shown pre and post-intervention BGM and diet score differences are shown between the groups divided by their BGM

baseline. Table 4 shows the changes in food consumption among all participants.

The patients favored the Apple of Health, "La Manzana de la Salud" guide because the Apple of Health shows them exactly how many portions they should eat at each meal. They also liked the Apple design because it was more appealing visually than the food pyramid. The Apple guidelines and the glucose monitoring were the two most important tools used to achieve blood glucose control.

Participants requested information regarding fat portions of commonly used Mexican foods and tips on how to lower the fat content of their diet. They also requested more information on the Apple of Health guide and the diabetes guidelines. They actively solicited directions and instructions on biochemical guidelines and recommendations for

**Table 2**  
Metabolic control changes after "Si se puede" program in Tijuana Clinic.

	Pre-Intervention		Post-Intervention		Change Percentage	P
	N	Mean	N	Mean		
Weight (kg)	87	77.7	63	75.6	β 2.7	0.003
BMI (kg/m <sup>2</sup> ) <sup>a</sup>	87	30.0	63	29.3	β 2.4	0.002
HbA1c <sup>b</sup>	87	11.1	63	9.3	β 16.2	0.01
Diet Score	87	5.4	63	8.3	Ŷ 54.0	0.001
Glucose <sup>c</sup>	87	175.4	63	141.3	β 19.4	0.001

a. BMI = Body mass index.

b. HbA1c, glycosilated hemoglobin.

c. Glucose, weekly average blood glucose.

**Table 3**  
Changes in pre and post-intervention blood glucose monitoring and diet score for each of two groups of diabetics with different blood glucose monitoring at baseline.

	Blood Glucose Monitoring = 140 mg/dl		P*	Blood Glucose Monitoring > 140 mg/dl		P*
	Pre-Intervention	Post-Intervention		Pre-Intervention	Post-Intervention	
<b>Blood glucose Monitoring</b>	109.9 ± 20.2	114.2 ± 31.1	ns	201.7 ± 47.7	150.4 ± 44.0	.001
<b>Diet Score</b>	5.9 ± 1.4	7.7 ± 1.8	.002	6.1 ± 1.5	8.2 ± 1.7	.001

\*T-Test Paired Samples

health care by specialists (ophthalmologist, podiatrist and nutritionist). One of the factors that participants identified as highly contributory to the improvement of their blood glucose levels was provider accessibility, openness, and positive belief in their potential for success. They stated that used of the Spanish language facilitated understanding and communication. In Tijuana, they especially appreciated the fact that the blood glucose monitoring and test strips were given to them at no charge.

## DISCUSSION.

Several researchers and clinicians have pointed out the need for better strategies to improve glycemic control of both Afro-Americans and Mexican-Americans (7, 19). Eberhardt *et al.* (7) found a clinically meaningful difference in mean glycosylated

hemoglobin (10.5 versus 8.4 %,  $p < 0.001$ ) between black and white people reporting diabetes. Among HHANES respondents of Mexican descent, dissatisfaction with health care and preference for being interviewed in Spanish were predictors for using alternative sources of health information (11).

When participants were compared according to baseline BGM, both groups increased their diet score. The group A, with acceptable BGM (lower than 140 mg/dL) increased their glucose slightly to an average of 114 mg/dL, while the group with BGM higher than 140mg/dL, decreased from an average 201 to 150 mg/dl ( $P < 0.0001$ ). To our knowledge this study is the first that uses a culturally sensitive tool, which was designed, evaluated and implemented for a Mexican population in the USA and Mexico. This tool is the food guide called "La Manzana de la Salud". Our

**Table 4**  
Changes on food consumption portions among Tijuana & San San Diego participants.

Food Groups	Tijuana (Portions consumed)			San Diego (Portions Consumed)		
	Pre	Post	P	Pre	Post	P
<b>Grains</b>	6.8	10.7	0.00	6.4	9.2	0.01
<b>Vegetables</b>	1.8	2.2	0.07	1.6	1.7	0.5
<b>Fruits</b>	1.9	2.5	0.02	1.8	2.0	0.3
<b>Dairy products</b>	1.1	2.2	0.0001	1.1	2.4	0.001
<b>Meat &amp; meat products</b>	2.0	2.0	0.6	1.9	1.3	0.1
<b>Fat</b>	2.2	2.8	0.2	1.9	1.9	0.8

findings show that after a seven-week session, there was a statistically significant reduction in weight, body mass index, glycosylated hemoglobin, average glucose and diet score (tables 2 and 3). In addition, participants increased their consumption of grain products, fruit and dairy products in both the Tijuana and San Diego clinics (table 4); however, the increased fruit consumption in the San Diego clinics was not statistically significant. The latter might be due to differences in fruits cost.

A survey conducted with literacy experts and health care providers found that the successful inculcation of knowledge about nutrition in patients with limited literacy skills is hindered primarily by insufficient provider time (20). It is also known that most patients of Mexican background ask family and friends for health information before seeking professional help. Literacy experts emphasized the importance of cultural differences, which may separate health care providers from target patient populations. Some physicians and health personnel have little awareness of cultural differences, especially related to food preferences and consumption patterns. The Mexican population also experiences different food consumption and health care patterns between rural and urban Mexicans, Northern and Southern geography, and Mexican-American born and raised versus Mexicans born and raised in Mexico. One of the advantages of the "Si se puede" program was that the health providers were familiar with these differences. Therefore, all the examples used in the group sessions pertained to typical foods from different regions of Mexico. This approach reinforced the relationship and confidence between facilitators and patients.

A variety of meal planning approaches are being used in the USA. A survey conducted to the participants at the diabetes care and education dietetic practice group offered at the 79<sup>th</sup> Annual Meeting and Exhibition of The American Dietetic Association documented the use of the exchange system (92%), general guidelines (75%), menu systems (45%), and carbohydrate counting (44%). An example of the increasing complexity of approaches is carbohydrate

counting, where there are three different levels of information: basic, intermediate and advanced. There were also different approaches of utilization of blood glucose levels results to make changes in diet and physical activity (21). The use of different levels of information is the result of assessing the ability of the patient to understand and follow the recommended approach for meal planning.

However, the investigators in this study have not found published data about meal planning approaches at different levels of information for Hispanic with diabetes. Neither have results reported the impact of different approaches on the metabolic control. The Apple of Health used in "Si se puede", utilizes a simplified method that includes labeling the three main meals, to prevent the usual practice of reducing the number of meals among Mexican diabetics (figure 1). In addition, the number of portions is fixed for each group in the graph to avoid the usual practice of reducing the grain consumption among Mexicans with diabetes. This use of a fixed number of portions for each of the main meals might be considered a simpler, friendly and less structured meal planning approach at a basic level. The program introduces the concept of carbohydrate, and fat counting and encourages the inclusion of consistent amounts of all food groups at meals and snacks. Using the Diet Score, which allows the assessment of the extent to which the patient is meeting the recommended portions of food, reinforces this approach. Thus, the Apple of Health might be an alternative for clients who are frustrated by more structured and complex meal planning approaches, and for those who have language and cultural barriers.

Overall, the qualitative and quantitative evaluations show that the program achieved a high level of acceptance by patients and health care providers. Most importantly, the program resulted in a statistically significant difference in blood glucose monitoring, increased adherence to the American Diabetic Association guidelines, and a higher level of patient satisfaction with the program from pre to post-intervention. We suggest the need of support for culturally sensitive intervention programs, using culturally validated tools, and trained health promoters.



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Further, the results document the need to include the whole family and relatives at some level, not only as support for the participants, but because they are a group at risk of developing diabetes.

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