

# After receiving language concordant, individual health education interventions, do Spanish speaking, diabetic inpatients at a safety net hospital demonstrate acquired diabetes self-management competency as measured by pre-training and post training evaluation of key, diabetes self-management knowledge?

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## Abstract

The purpose of this research was to assess the quality of the inpatient, health education diabetes program as it relates to primary Spanish speaking patients. Complications from diabetes account for huge personal and financial costs. There is substantial evidence supporting the use of targeted diabetes education to reduce complications but we need to know if our education interventions are valid. In order to accomplish this by auditing the knowledge of a sample of inpatient diabetics before and after receiving the standard MMC Spanish language diabetes education interventions via Spanish language pre and post surveys (standardized by the previously validated SKILLD survey). Demographic and clinical data were analyzed and all significant data (p value <0.05) were considered for their importance. The data demonstrated that in all 10 items on the survey, overall patients were able to demonstrate significant improvement in survey scores. Additionally, comparisons of demographic data demonstrated that being less than 50 years old was associated with improved survey scores. This indicates overall benefit of the training program as well as possible insight into need for more aggressive training for patients greater than 50 years in age.

## Introduction

Diabetes mellitus is among the most common chronic diseases in the USA. Complications compound huge costs and present a substantial burden on our healthcare system. Many people with diabetes mellitus type II can control their disease through diet and exercise, reducing their need for medication and their risk for complications. The role of diabetes education in reducing morbidity and mortality, as well as cost burden is especially great for Maricopa Medical Center (MMC) and other social net hospitals. The need for culturally competent education is an additional challenge for helping patients. Maricopa Medical Center provides direct, one-on-one diabetes education for inpatients admitted to the hospital with diabetes. It also meets unique cultural and linguistic needs. The purpose of this research was to evaluate MMC diabetes education by assessing patient knowledge immediately before and after Spanish language health education.

## Methods

45 total patients participated in the study, which identified primary Spanish speaking inpatients with a diagnosis of diabetes (defined as A1C>7). Patients underwent a pre and post survey in Spanish to evaluate their knowledge before and after undergoing one on one health education by the MIHS diabetes educator. The education program was developed by MIHS and utilizes a motivational, transtheoretical model. It includes simple text and images to help as well. The survey (SKILLD survey) used is seen below in figure 1. It has been previously validated in both English and Spanish in separate studies. Demographic data, total scores, and individual question results were compared using linear regression, Wilcoxon signed rank test, and McNemar's test respectively.

**Table 1. SKILLD Items in English and Translated into Spanish, With Revised Answer Key.**

Item no.	SKILLD Items in English	Estado De Conocimiento: Chd Di. Pruebas Diabetes Con Baja Nivel de Lectoescritura	Correct responses (Revisión)
1	What are the signs and symptoms of high blood sugar? (Name at least 2)	¿Cuáles son las signos y síntomas del azúcar alta en la sangre? (al menos dos)	Answer must contain 2 of any of the following: extreme thirst, frequent urination, drinking or eating, blurred vision, drowsiness, fatigue
2	What are the signs and symptoms of low blood sugar? (Name at least 2)	¿Cuáles son las signos y síntomas del azúcar bajo en la sangre? (al menos dos)	Answer must contain 2 of any of the following: hunger, nervousness, jitteriness, mood swings, irritability, confusion, weakness, fast heart rate, dizziness, light-headedness, weakness
3	How do you feel when your blood sugar is too low? How do you treat low blood sugar?	¿Cómo se siente cuando tiene muy bajo su nivel de azúcar? ¿Cómo trata el nivel bajo de azúcar?	Answer must be clear about action: drink juice, eat candy, drink milk, eat sugar or sweets, drink sugar/soft drink, or at least 15 grams of carbohydrates
4	How often should a person with diabetes check his or her blood sugar? (Name at least 2)	¿Qué tan seguido (en qué frecuencia) una persona con diabetes debe revisar su azúcar?	Answer cannot vary: daily
5	Why are foot exams important in someone with diabetes?	¿Por qué son importantes las exámenes de los pies en las personas con diabetes?	Answer must be clear about action. The following are examples. Answers may vary but must be clear about consequences. Feet get damaged, check for sores, check for wounds, podiatrist/doctor changes or puts worse
6	Why is it important to look at your feet? Why are you looking for?	¿Por qué es importante que se revise los pies? ¿Qué busca cuando se los revisa?	Answer must contain a two-part answer: "feet are sore", "feet can include ulcers", "feet get damaged", "diabetes causes eye problems, blindness", "eye can get damaged", "check for sores, check for wounds, podiatrist/doctor changes or puts worse"
7	What is a normal fasting blood glucose or blood sugar? (Name at least 2)	¿Cuál es un nivel normal de glucosa o de azúcar en la sangre en ayuno?	Both numbers (range) must be included: 70 or 80 to 100
8	What is a normal HbA1c (hemoglobin A1c) or "average blood sugar test"? (Name at least 2)	¿Cuál es un nivel normal de HbA1c (hemoglobina A1c) o "prueba promedio de azúcar en la sangre"?	Any number <7
9	How many times per week should someone with diabetes exercise and for how long? (Name at least 2)	¿Cuántas veces a la semana debería hacer ejercicio alguien con diabetes y por cuánto tiempo?	Answer must contain a two-part answer: "Numbers reported must fall within range: 3 to 5 times per week and 30 to 45 minutes"
10	What are some long-term complications of uncontrolled diabetes? (Name at least 2)	¿Cuáles son algunas de las complicaciones a largo plazo de la diabetes no controlada?	Answer must contain any 2 of the following: "impaired vision, kidney damage, dialysis, amputation, wounds, ulcers, neuropathy, impotence, heart problems, foot problems, ear problems, or high blood pressure"

Figure 1: SKILLD survey in English and Spanish. This survey has been previously validated in both languages as an appropriate assessment of diabetes knowledge.

## Results: Experiment 1

Overall pre and post test score demonstrated a significant improvement in survey results. Figure 2 below represents this change. Predictive qualities for improved score were assessed by comparing demographic data to change in survey score. Table 1 summarizes this data. Age less than 50 was associated with improved score but no other qualities demonstrated significant increase in score.

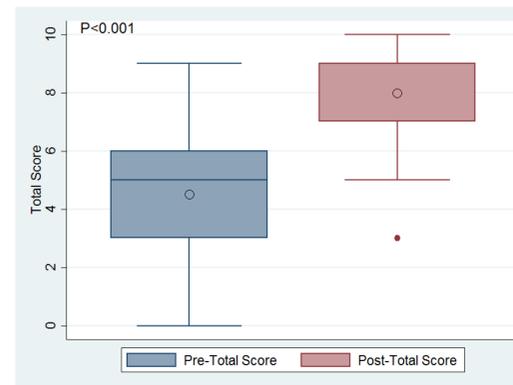


Figure 2: Total score using Wilcoxon Signed Rank for comparison between Pre and post Total Scores. Demonstrates a mean pre test score was 4.44 and post test of 7.98. The score differential was 3.53

PREDICTORS	LOG OF CHANGE IN SCORE	
	Coefficient (95% CI)	P-value
AGE		
<=50	REF	
>50	-0.35 (-0.69, -0.02)	0.03
GENDER (MALE)	0.11 (-0.23, 0.45)	0.51
EDUCATION		
NONE	Ref	
PRIMARY	-0.67 (-1.72, 0.38)	0.20
SECONDARY	-0.75 (-1.86, 0.34)	0.16
COLLEGE	0.35 (-1.05, 1.75)	0.61
PREVIOUS DM EDUCATION	0.21 (-0.17, 0.59)	0.28
MONTHS HAVING DM		
<=150	REF	
>150	-0.18 (-0.56, 0.20)	0.34
YEARS IN COUNTRY		
<=20	REF	
>20	0.07 (-0.29, 0.42)	0.70
A1C		
<=10	REF	
>10	-0.12 (-0.45, 0.20)	0.45
BASELINE SCORE	-0.16 (-0.24, -0.09)	<0.001

Table 1. Predictors of Increased Change in Score calculated using multiple linear regression. This data did not demonstrate significant predictors of increased score differential by demographic data except for age less than 50.

## Discussion and Conclusions

Overall, the findings of this research are very positive. The significant improvement in survey scores for every question indicate that patients are learning about core measures of diabetes education with a one on one intervention from the MIHS Diabetes Health Educator. This data does not reflect health outcomes or long term learning outcomes. As such it provides a foundation for future analysis including follow up testing of diabetes knowledge to assess retention. It would also be prudent to measure outcomes like reduction in diabetes complications as a final comparison of the program's efficacy. Furthermore, the data did not reveal many predictive factors for success in undergoing education. It was learned, however, that patients over the age of 50 do not immediately retain as much information from the education as younger patients. This could inform decisions in the future in identifying how to educate patients. It may be prudent to consider if younger patients could be educated by nurses or other professionals and free up more time for the health education team to work with older patients. This data demonstrates a clear benefit to the program's existence and can hopefully be exploited to utilize the MIHS education resources to its fullest.

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