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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I. Abstract: Diabetes mellitus is among the most common chronic diseases in the United States. Complications from diabetes compound huge costs and presents a substantial burden to the nation's healthcare system. Many people with diabetes mellitus type II can control their disease through diet and exercise, reducing their need for medication and greatly reducing 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 in the USA. Maricopa Medical Center provides health education in an effort to meet a number of needs within the Greater Phoenix area, including a large proportion of limited English proficient, Spanish speakers. This includes direct, one-on-one diabetes education for inpatients admitted to the hospital with diabetes that also meets unique cultural and linguistic needs. 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. We accomplished 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.

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Introduction, Significance, Rationale:

Introduction

Maricopa Medical Center is a safety net hospital that boasts a history of over 100 years of service to Phoenix, AZ and its surrounding area. In 2012, the medical center admitted over 18,000 inpatients.[2] Understanding the costs related to diabetes complications and the increased prevalence of diabetes among Latinos, Maricopa Medical Center recognizes the vital need for impactful, culturally and linguistically concordant health education in order to inform healthier behaviors in their diabetic patients, reducing their morbidity and mortality, as well reducing the great costs incurred by diabetes complications. This is facilitated through health education programs, including specific diabetes education programs made available throughout the entire Maricopa Integrated Health Systems network, to include Maricopa Medical Center. Among its health education programs, MMC provides one-on-one diabetes education for all admitted patients. MMC serves a high population of patients with low health literacy. It also serves a large Latino and limited English proficiency patient profile. As such, MMC is especially suited to produce data specific to its various underserved communities and is a model for the development of health strategies that address their specific needs. The quality and effectiveness of their interventions must be dynamic in order to accommodate and reflect the diversity of Maricopa County. The maintenance of this quality can provide valuable insights into the best practices available for health education among Latinos.

Significance

The Center for Disease Control estimates that about 29.1 million of the US population has diabetes. In Maricopa County, it was estimated in 2011 that county wide prevalence of diabetes was 227,123.[3] While the diabetes patient population is composed of a broad representation of the nation's racial and economic makeup, certain minority populations are disproportionately affected by the disease. In comparison to Non-Hispanic whites, Hispanic individuals demonstrate a greater prevalence of diabetes. 12.8% of Hispanic population age 20 or older has diabetes in comparison to the 7.8% of the Non-Hispanic, white population.[4] The Agency for Healthcare Research and Quality reported a 2010 statistical brief stating that in 2008 there were over 7.7 million hospital stays for patients with diabetes. About 540,000 of those stays cited diabetes as the principal diagnosis for the admission. Of those stays, the mean cost of a diabetic's hospital stay is over $2,000 more costly than a patient without diabetes, and is also typically longer- averaging one day more in the hospital.[5] Since the complications of poorly controlled diabetes include blindness, kidney damage, cardiovascular disease, and lower limb

amputation, interventions that successfully improve diabetes control can have significant improvements on a patient's quality of life, as well as relieve economic burden on the healthcare system. Research shows that one of the most effective ways to help patients manage their diabetes is through effective educational programs founded in self-management skills. Educational interventions have been shown to reduce A1C over long term follow up[6] and reduce certain complications.[7] Despite their disproportionate diabetes prevalence and great need, there are a number of challenges in developing necessary education programs for Latinos. Barriers of language, acculturation, and health literacy add difficulty in creating and implementing programs. In serving such a diverse community with rapidly changing needs, it is necessary to develop tools to monitor the efficacy of educational programs in order to ensure that they are providing adequate help to patients.

Rationale

As a current policy, each admitted patient with a primary or secondary diagnosis of diabetes (A1C <7) at MMC receives individual health education. The information is provided by the diabetes educator or by nursing staff. The diabetes educator sees all patients with severely uncontrolled diabetes and all other diabetes patients are seen depending on staff availability. Educators are Registered Dietitians or nursing staff. Education materials have been developed in house by the health education team and are designed with consideration of low literacy. Materials are available in English and Spanish. Since this prospective research targets Spanish health education, we will identify materials in that language. The text *¿Cómo puedo controlar mi diabetes?* (How can I control my diabetes?) uses simple text and pictographic demonstrations of core elements of diabetes control: meal planning, exercise, medication, and managing stress. It also deals with special situations, like hyperglycemic episodes. The material is dynamic and edited by the health educators to meet the needs of their patients. The accompanying educational delivery is motivational and rooted in the trans-theoretical model of behavior. The benefit of this research as it applies to the current practice at MMC is to measure the quality of health education before and after its implementation. This research provided information about potential for change as well as current best practices for similar programs. Additionally, The Centers for Medicaid and Medicare Service has identified A1C control among its 33 measures of quality for Accountable Care Organizations. Identifying and attending to the quality of diabetes control interventions is of value to a medical practice in terms of patient care, economic benefit, and regulation.

Materials and Methods

Design

This was a prospective, quasi-experimental, repeated measure that tests diabetes knowledge at baseline (preintervention) and follow-up (postintervention) of Spanish speaking diabetic inpatients immediately after receiving instruction from the diabetes health educator.

Sample and Recruitment

The sample size goal for this study was 50 participants. Overall 45 patients were surveyed prior to and after the education intervention that met the inclusion criteria. The inclusion criteria included patients that are admitted to the Maricopa Medical Center, had an established or new diagnosis of diabetes mellitus type 2 (A1C $\geq$ 7), and preferred to communicate in Spanish over English when discussing health topics. After institutional review board approval was obtained through the MIHS IRB Board, participants were invited to participate in the study and were informed about the study in Spanish. No identifying data was recorded and they were permitted to consent verbally.

Methods

The Spoken Knowledge in Low Literacy in Diabetes (SKILLD) assessment is a valuable tool for measuring diabetes knowledge. The 10 item scale is available for public use and lends itself to this research since it offers a brief, but targeted assessment of an individual's diabetes knowledge. The scale is a spoken interview of 10 questions about basic diabetes management. Each question is scored as pass/fail and the results are demonstrated out of 10. It was originally developed as a diabetes questionnaire for use in the African American community, but has been successfully implemented in similar research in the Latino community as well. Additionally, the utility of the scale for assessing diabetes knowledge in the Latino Community has been researched independently, and the SKILLD scale was determined to accurately demonstrate diabetes knowledge among Spanish speaking Latinos[8]. After obtaining appropriate permissions, the validated translation of the SKILLD scale was used for this study.

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

Item no.	SKILLD items in English	Escala De Conocimiento Oral En Pacientes Diabéticos Con Bajo Nivel de Lectoescritura	Correct responses *(Revisions)*
1	What are the signs and symptoms of high blood sugar? (Name at least 2)	*¿Cuáles son los signos y síntomas del azúcar alto 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.
	Probe: How do you feel when your blood sugar is high or when you are were diagnosed?	*Exploración: ¿Cómo se siente cuando tiene alto su nivel de azúcar o cuando le diagnosticaron que lo tiene alto?*	
2	What are the signs and symptoms of low blood sugar? (Name at least 2)	*¿Cuáles son los signos o 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, sweatiness, fast heart rate *dizziness, lightheadedness, weakness*
	Probe: How do you feel when your blood sugar is too low?	*Exploración: ¿Cómo se siente cuando tiene muy bajo su nivel de azúcar?*	
3	How do you treat low blood sugar?	*¿Cómo trata el nivel bajo de azúcar?*	Answer must be clear about action: drink juice, eat candy, drink milk, *eat sugar or sweets, drink sugared soft drink*, or at least 15 grams of carbohydrates
	Probe: What should you do if your sugar is too low? How can you bring your blood sugar up if it's too low?	*Exploración: ¿Qué debería hacer si tiene bajo su nivel de azúcar? ¿Cómo puede usted subir su nivel de azúcar si está muy baja?*	
4	How often should a person with diabetes check his or her feet?	*¿Qué tan seguido (con qué frecuencia) una persona con diabetes debe revisarse sus pies?*	Answer cannot vary: daily
	Probe: Once a day, once a week, or once a month?	*Exploración: ¿Una vez al día, una vez a la semana o una vez al mes?*	
5	Why are foot exams important in someone with diabetes?	*¿Por qué son importantes los 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, feeling/sensation changes or gets worse*
	Probe: Why is it important to look at your feet? What are you looking for?	*Exploración: ¿Por qué es importante que se revise los pies? ¿Qué busca cuando se los revisa?*	
6	How often should you see an eye doctor and why is it important?	*¿Qué tan seguido (con qué frecuencia) debería consultar a un oftalmólogo (oculista) y por qué es importante?*	Answer must contain a two-part answer: Visits are yearly. Reasons can include *check for eye damage, diabetes causes eye problems*, blindness*can occur, eyes can get damaged*, glaucoma, or *check for changes in eyes*
	Probe: How often? Why?	*Exploración: ¿Qué tan seguido (con qué frecuencia)? ¿Por qué?*	
7	What is a normal fasting blood glucose or blood sugar?	*¿Cuál es un nivel normal de glucosa o de azúcar en la sangre en ayunas?*	Both numbers [range] must be included: 70 or 80 to 120
	Probe: When you get up first thing in the morning and check your blood sugar before you eat or take medicine, what should it be? What 2 numbers?	*Exploración: ¿Cuando se levanta temprano en la mañana y revisa su nivel de azúcar antes de comer o tomar alguna medicina, qué nivel de azúcar debería tener? ¿Cuáles son los 2 números (nivel más alto y más bajo) que debería tener?*	
8	What is a normal HbA1c (hemoglobin A1C) or "average blood sugar test"?	*¿Cuál es un nivel normal de HbA1c (hemoglobina A1C) o "prueba promedio de azúcar en la sangre"?*	Any number <7
	Probe: When they draw blood from your arm and get an average blood sugar reading, what should it be?	*Exploración: ¿Cuando le sacan sangre de su brazo y obtienen una lectura promedio de azúcar en la sangre, cuál debería ser la lectura promedio?*	
9	How many times per week should someone with diabetes exercise and for how long?	*¿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
	Probe: How many times per week should someone with diabetes exercise and for how long?	*Exploración: ¿Cuántas veces a la semana? ¿Cuánto tiempo por día?*	
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 sin control?*	Answers must contain any 2 of the following. Answer must state consequences: blindness, impaired vision, kidney damage, dialysis, amputation, *wounds, infections*, neuropathy, impotence, *stomach problems, heart problems, foot problems*, or *high blood pressure*
	Probe: Do you know anyone that has diabetes and had "bad things" happen to them? What are some of those "bad	*Exploración: ¿Sabe usted de alguien que tenga diabetes y que le haya sucedido "cosas malas"? ¿Cuáles son algunas de esas "cosas malas"?*	

Figure 1. Example of SKILLD Assessment with Translation by Garcia et al[8]

Before a session were conducted with the health educator, participants were guided through the interview style survey. The educator, Sandra Chmelnik, RD conducted her education interventions. The education program uses simple text and pictographic demonstrations of core elements of diabetes control: meal planning, exercise, medication, and managing stress. It also deals with special situations, like hyperglycemic episodes. The material is dynamic and edited by the health educators to meet the needs of their patients. The accompanying educational delivery is motivational and rooted in the trans-theoretical model of behavior. The survey was re-conducted immediately after the session to identify any gains in knowledge. This process was achieved by administering the SKILLD survey before and after health education intervention. Surveys were de-identified. Data was collected intermittently over a 2 year period.

Data Analysis

Demographic and clinical characteristics was assessed using means, standard deviations for continuous variables and frequencies, proportions for categorical variables. Summary change in pre/post test SKILLD scores were compared with the Wilcoxon Signed Rank Test. Individual SKILLD question responses were compared using McNemar's tests. Linear Regression was implemented to ascertain the mean differences in the change of SKILLD Scores between categories within the demographics and clinical characteristics. All p-values were 2-sided and $p<0.05$ was considered statistically significant. All data analysis were conducted using STATA version 14 (College Station, TX).

Results

Demographic Data:

Baseline demographic data was collected and the mean and standard deviation values were calculated. The mean age was 53.2 (SD 10.6). 48.9% of the participants were male. 2.2% had no formal education and 2.2% were college education. 62.2% had only primary education. 33.3% had secondary education. 51.1% had previous diabetes education. The mean number of months since they were diagnosed with diabetes was 132.4 (SD 111.2). The mean number of years in the United States was 18.4 (SD 8.9). The mean Hemoglobin A1C last measured at the time of their hospital stay was 10.1 (SD 2.6). These values are demonstrated in table 1 below.

Characteristics	Values N=45
Age (mean, SD)	53.2 (10.6)
Gender (male, %)	22 (48.9)
Education (n, %)	
None	1 (2.2)
Primary	28 (62.2)
Secondary	15 (33.3)
College	1 (2.2)
Previous DM Education (yes, %)	23 (51.1)
Months with DM (mean, SD)	132.4 (111.2)
Years in Country (mean, SD)	18.4 (8.9)
HbA1c (mean, SD)	10.1 (2.6)

Table 1. Demographic Data

Pre/post Score Data:

The overall mean pre-test SKILLD survey score was 4.44 (SD 2.57). The post-test score was 7.98 (SD 1.89) with a score difference of 3.533 (SD 2.47). The comparison was significant with a p value < 0.001. The values and box and whisker graphs for comparison of pre/post scores are below (figures 3 & 4).

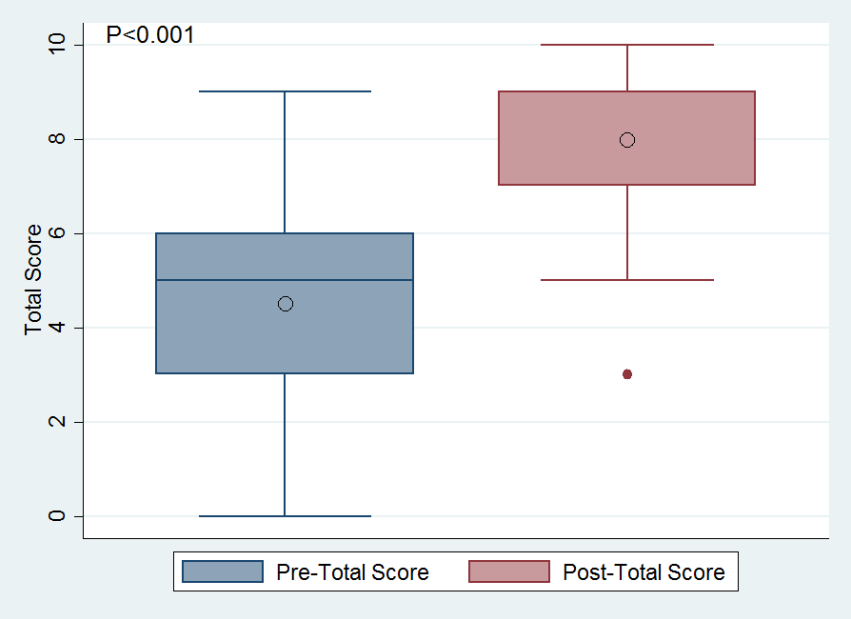

Figure 2. Total score using Wilcoxon Signed Rank for comparison between Pre and post Total Scores

VARIABLE	OBS	MEAN	STD. DEV.	MIN	MAX
TOTAL PASS 1	45	4.444444	2.57219	0	9
TOTAL PASS 2	45	7.977778	1.888829	3	10
SCORE DIFF	45	3.533333	2.473496	0	8

Table 2. Mean, Min. and Max scores with standard deviation

The pass rate for each question showed significant increases in the percentage of correct answers with p values ranging from <.001 to <.007. Table 2 below demonstrates the individual number and percentage of correct responses with corresponding p-values.

Pass Rates per question

QUESTION NUMBER	PRE INTERVENTION	POST INTERVENTION	P-VALUE
	N (%)	N (%)	
1	14 (31.1)	30 (66.7)	<0.001
2	23 (51.1)	34 (75.6)	0.007
3	35 (77.8)	44 (97.8)	0.004
4	20 (44.4)	43 (95.6)	<0.001
5	26 (57.8)	41 (91.1)	<0.001
6	15 (33.3)	35 (77.8)	<0.001
7	7 (15.6)	30 (66.7)	<0.001
8	8 (17.8)	25 (55.6)	<0.001
9	25 (55.6)	37 (82.2)	<0.001
10	26 (57.8)	37 (82.2)	0.002

P-values calculated using McNemar's Test.

Table 3. Pass Rates per Question

Predictors of Increased Change in Score

Demographic data were compared to the log values of change in score in order to identify any values that may predict increased difference in pre-test and post test scores. Gender, level of education, A1C, time in country, time with diabetes, and previous diabetes experience did not demonstrate any significant effect on improvement on the survey. Being less than 50 years old was associated with overall 35% (95% CI 2%-69%) score improvement. Table 4 below provides change in score per each predictive factor with accompanying p-values.

Individual Questions

Table 5 demonstrates which individual question answers showed significant improvement with analysis per acceptable answer choice. Significant improvements include identifying drowsiness as a sign of hyperglycemia, sweats as a sign of hypoglycemia, eating candy or a sugary drink as a treatment for hypoglycemia, indication for foot checks as daily, indication for eye checks as yearly, correct values for blood glucose, correct values for A1C, and correct recommended exercise frequency and duration. Values for other questions did not reach statistical significance.

Predictors of Score Improvement

	LOG OF CHANGE IN SCORE	
PREDICTORS		
	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

Multiple Linear Regression adjusting for all other variables in the model.

Table 4. Predictors of Increased Change in Score

Individual Question Breakdown by Values

	PRE	POST	P-VALUE
	N, %	N, %	
EXTREME THIRST (Q1)	15 (33.3)	18 (40.0)	0.46
FREQUENT URINATION (Q1)	12 (26.7)	16 (35.6)	0.24
FREQUENT DRINKING (Q1)	0 (0.0)	1 (2.2)	0.31
FREQUENT EATING (Q1)	1 (2.2)	6 (13.3)	0.06
BLURRED VISION (Q1)	6 (13.3)	8 (17.8)	0.52
DROWSINESS (Q1)	4 (8.9)	13 (28.9)	0.003
FATIGUE (Q1)	4 (8.9)	9 (20.0)	0.02
HUNGER (Q2)	5 (11.1)	4 (8.9)	0.56
NERVOUSNESS (Q2)	5 (11.1)	10 (22.2)	0.06
JITTERINESS (Q2)	12 (26.7)	11 (24.4)	0.73
MOOD SWINGS (Q2)	2 (4.4)	2 (4.4)	1.0
IRRITABILITY (Q2)	1 (2.2)	2 (4.4)	0.31
LIGHTHEADEDNESS (Q2)	4 (8.9)	7 (15.6)	0.17
SWEATINESS (Q2)	3 (6.7)	13 (28.9)	0.002
FAST HR (Q2)	1 (2.2)	2 (4.4)	0.31
DIZZINESS (Q2)	15 (33.3)	18 (40.0)	0.25
CONFUSION (Q2)	1 (2.2)	1 (2.2)	1.0
WEAKNESS (Q2)	13 (28.9)	13 (28.9)	1.0
DRINK JUICE (Q3)	1 (2.2)	8 (17.8)	0.008
EAT CANDY (Q3)	2 (4.4)	2 (4.4)	1.0
DRINK MILK (Q3)	0 (0.0)	0 (0.0)	1.0
EAT CANDY (Q3)	1 (2.2)	0 (0.0)	1.0
DRINK MILK (Q3)	0 (0.0)	0 (0.0)	1.0
EAT SUGAR/SWEETS (Q3)	26 (57.8)	26 (57.8)	1.0
DRINK SUGARED DRINK (Q3)	5 (11.1)	14 (31.1)	0.003
15+ GRAMS OF CARBOHYDRATES (Q3)	1 (2.2)	1 (2.2)	1.0
DAILY (Q4)	20 (44.4)	43 (95.6)	<0.001
FEET GET DAMAGED (Q5)	7 (15.6)	14 (31.1)	0.03
CHECK FOR SORES (Q5)	8 (17.8)	11 (24.4)	0.31
CHECK FOR WOUNDS (Q5)	15 (33.3)	23 (51.1)	0.06
FEELING/SENSATION WORSENS (Q5)	3 (7.7)	1 (2.2)	0.15
OTHER ACCEPTABLE ANSWER (Q5)	1 (2.2)	3 (6.7)	0.15
YEARLY (Q6A)	18 (40.0)	38 (84.4)	<0.001
CHECK FOR EYE DAMAGE (Q6B)	2 (4.4)	4 (8.9)	0.41
DM CAUSES EYE PROBLEMS (Q6B)	5 (11.1)	10 (22.2)	0.09
BLINDNESS CAN OCCUR (Q6B)	13 (28.9)	15 (33.3)	0.52
EYES CAN GET DAMAGED (Q6B)	1 (2.2)	2 (4.4)	0.31
CHECK FOR GLAUCOMA (Q6B)	2 (4.4)	4 (8.9)	0.31
CHECK FOR EYE CHANGES (Q6B)	1 (2.2)	4 (8.9)	0.17
OTHER ACCEPTABLE ANSWERS (Q6B)	1 (2.2)	2 (4.4)	0.31
Q7080-120 (Q7)	8 (17.8)	29 (64.4)	<0.001
Q0-5.7 (Q8)	2 (4.4)	4 (8.9)	0.31
Q5.7-6.5 (Q8)	2 (4.4)	1 (2.2)	0.31
Q6.5-7 (Q8)	4 (8.9)	21 (46.7)	<0.001
Q3-5X PER WEEK (Q9)	31 (68.9)	44 (97.8)	<0.001
Q30-45 MIN PER WEEK (Q9)	28 (62.2)	39 (86.7)	0.002
BLINDNESS (Q10)	21 (46.7)	27 (60.0)	0.08
IMPAIRED VISION (Q10)	4 (8.9)	9 (20.0)	0.02
KIDNEY DAMAGE (Q10)	11 (24.4)	18 (40.0)	0.02
DIALYSIS (Q10)	1 (2.2)	1 (2.2)	1.0
AMPUTATION (Q10)	8 (17.8)	11 (24.4)	0.17
STOMACH PROBLEMS (Q10)	1 (2.2)	1 (2.2)	1.0
FOOT PROBLEMS (Q10)	5 (11.1)	11 (24.4)	0.03
HEART PROBLEMS (Q10)	3 (6.7)	8 (17.8)	0.06
WOUNDS (Q10)	6 (13.3)	5 (11.1)	0.65
INFECTIONS (Q10)	4 (8.9)	4 (8.9)	1.0
NEUROPATHY (Q10)	2 (4.4)	3 (6.7)	0.31
IMPOTENCE (Q10)	0 (0.0)	0 (0.0)	1.0
HIGH BP (Q10)	0 (0.0)	0 (0.0)	1.0
OTHER APPROPRIATE ANSWER (Q10)	1 (2.2)	2 (4.4)	0.31

p-values calculated using McNemar's Test

Table 5. Comparison of Pre and Post Scores by Answer Choice

Discussion:

Overall the data demonstrates that overall the program is very effective. The pre-test SKILLD survey score (out of 10) was 4.44 (SD 2.57) and post-test score was 7.98 (SD 1.89) with a score difference of 3.533 (SD 2.47). The post test scores demonstrated statistically significant increases. This aligns with previous research which shows increase knowledge about diabetes management associated with focused education and infers improved long term health outcomes.[1,6,9] This informs appropriate conclusions about the overall efficacy of the learning intervention. Despite substantial increases in pre/posttest knowledge, there were still some topics that could need additional reinforcement when the percentage of correct individual questions was compared. The correct answer regarding A1C understanding increased from 17.8% to 55.6% correct responses. There is clear benefit, but the overall number of correct responses is still quite low. It may prove beneficial to reinforce this topic in future changes to the program.

Demographic data was compared to change in score in order to identify any patient characteristics that may predict better or poorer outcomes from the education. This was done by converting the change in score into logarithmic values in order to analyze data with unimodal distribution, as it was bimodal as raw data. Linear regression analysis was utilized to identify any significant association. It was originally hoped that this data could identify especially useful values like A1C to help identify which patients may need additional education or could help MIHS triage its resources based on likelihood of demonstrable improvement. Unfortunately, except for age, no values were significantly predictive. The findings regarding age indicated that, when compared to patients over 50 years old, younger patients score 35% better. The confidence interval however was broad (2%-69%) so the utility of this data could be

The breakdown of individual questions varied quite a bit. There were some statistically significant improvements in answers, but other questions were much more heterogeneous. This makes it appear that in some cases patients answered a question correctly in the pretest and answered differently in the post test. This is likely due to the makeup of the survey which required two correct answers for many questions. As a result, patients weren't prompted to answer every correct choice, only any two correct choices. This may upsets how interpretable the data is and limits the conclusions that can be drawn from it.

Potential Pitfalls

As a quasi-experimental, repeat measure test, the research is immediately susceptible to regression of the mean. Though useful, evaluations of the SKILLD survey have demonstrated that individuals with less US acculturation score lower on their baseline assessments.[8] While this could reflect the conditions of low literacy and differences in healthcare between nations and certain immigrant populations, there is no definitive causative factor and should be considered in evaluating SKILLD data results. Additionally, the brevity of the SKILLD survey is useful for clinical implementation, it opens the data up for error. Data was also collected by one assessor and the education was performed by one individual as well. This creates room for error.

Conclusion:

With any intervention, the constant maintenance of efficacy and quality are necessary for the best patient outcomes. That maintenance is often the product of persistent internal assessment of quality. The purpose of this research was to audit the efficacy of an integral program developed, implemented, and managed by the MMC health educators. Diabetes education is a life saver and a cost saver. This research helps ensure that the methods used to educate Spanish speaking diabetes patients at MMC are carefully tailored to the linguistic and cultural needs of its community. Additionally, this data is preliminary and will offer insight into potential for further quality measures.

Overall, the findings of this research are very positive. The significant improvement in survey scores for every question indicate that patients are learning about all the 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 education patients. Perhaps older patients need more intensive intervention or suggestion for follow up education outpatient (which is currently offered to all patients). It may also 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.

References

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