

## Research Article

# Effectiveness of an Educational Strategy Focused on Foot Care in Patients with Diabetes Mellitus in Tijuana, Mexico

Verdugo-Salazar JPN<sup>1</sup>, Coria-Chavez K<sup>1</sup>, Ruiz-Gonzalez G<sup>1</sup>, Bermudez-Villalpando VI<sup>1</sup>, Lopez-Gomez RJ<sup>2</sup> and Ramirez-Leyva DH<sup>3\*</sup>

<sup>1</sup>Department of Family Medicine, Family Medicine Unit #27 (IMSS), Baja California Delegation, Mexico

<sup>2</sup>Department of General Medicine, Autonomous University of Sinaloa (UAS), Sinaloa, Mexico

<sup>3</sup>Department of Family Medicine, Family Medicine Unit #37 (IMSS), Sinaloa Delegation, Mexico

\*Corresponding author: Ramirez-Leyva Diego Hazael, Department of Family Medicine, Family Medicine Unit #37 (IMSS), Sinaloa Delegation, México

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## Abstract

**Background:** Diabetic Neuropathy (DN) is a microvascular complication manifested by unfavorable evolution of Diabetes Mellitus (DM), which, when not receiving adequate treatment, is invalidating. Education on this topic has shown benefits in the development of the disease and delay its appearance.

**Aim:** The purpose of this study is to determine the effectiveness of an educational intervention on the knowledge of foot care in patients with diabetes mellitus.

**Design and Setting:** Uncontrolled clinical trial, educational intervention before and after.

**Methods:** In 77 patients in the Family Medicine Unit #27, Tijuana, Baja California, an educational intervention was carried out. Six educational sessions were given with groups of 10 individuals, each educational intervention lasted 20-30 minutes; relevant topics for foot care in patients with diabetes mellitus were addressed. Two measurements of knowledge about foot care were made, one before and the other after the intervention; the Foot Care Confidence Scale (FCCS) in Spanish was used to assess knowledge. To determine differences between the knowledge before and after, the Wilcoxon test was used for statistical significance with 95% interval confidence ( $p < 0.05$ ).

**Results:** We analyzed 77 participants who attended all the educational sessions, there was no loss of patients. An increase in knowledge about foot care after receiving the intervention was found (Wilcoxon Z: -6.905,  $p < 0.05$ ).

**Conclusion:** The educational strategy was effective to increase the knowledge of foot care. It is recommended to perform similar interventions in larger groups and to promote lines of research focused on preventing peripheral complications of Diabetes Mellitus.

**Keywords:** Diabetic Foot; Educational Strategy; Diabetes Mellitus

## Introduction

Diabetic neuropathy is a group of heterogeneous disorders, usually produced by high glucose levels sustained for a long period of time, affecting the distal nerve endings mainly in the lower limbs. One of the most frequent complications is diabetic foot, a disabling disorder that results in devastating consequences for the integrity of the patient with Diabetes Mellitus [1]. A multidisciplinary approach is recommended for the care of this type of foot, which is described as a high risk foot, changing the follow-up that should be given to the patient with DM. An annual evaluation must be carried out by physicians of first contact in feet without risk and, if the foot has a high risk, it should be followed up every 3-6 months. It has been shown that in high-risk patients, education reduces the incidence of ulcers and amputations, reducing the evolution of complications of diabetic neuropathy [2].

In 2016, it was reported that of the total of patients with a previous diagnosis of diabetes, 41.2% had symptoms of diabetic neuropathy

and it is estimated that 46.4% with diagnosis of neuropathy are not aware of preventive measures. In recent years it has been reported that the most used preventive measures have been foot care [3]. There are sociocultural barriers that affect patients in the modification of lifestyle and techniques to perform foot care. The most common barriers described are lack of medical knowledge, administrative limitations, logistical barriers and lack of communication [4]. Since the beginning of the 21<sup>st</sup> century, a consensus was established in which foot care requires multidisciplinary management at the first and second level of care, first contact physicians and nurses must be educated about care of the foot and how to recognize early lesions of the diabetic foot, in order to reduce the incidence of disease and sequelae in patients with established diagnosis [5].

One reason why it has been shown that educational interventions work in patients with DM is by empowerment, which is the process where patients have the knowledge, skills, attitudes and self-awareness to be able to influence behavior. Similarly, patients can influence other patients with DM, to form a trend that is transmitted between each

**Table 1:** Educational intervention sessions.

Session	Topic	Key points
1	Introduction and Diagnostic evaluation	The work team, educational strategy and main objective will be presented. Diagnostic evaluation before the strategy with the FCCS instrument
2	Introduction to Diabetes Mellitus	Definition of Diabetes Mellitus, types of DM, risk factors and symptoms
3	Food and exercise in DM	Know the benefits of exercise and healthy eating for a patient with DM
4	Care and exploration of the feet	Select and inspect the proper footwear, recognize and avoid risk practices and identify alterations in feet
5	Live with DM	Compile the most important topics, skills and knowledge acquired during the sessions and develop a foot care manual
6	Final evaluation	Final evaluation of the strategy with the FCCS instrument

patient [6]. Based on the above, the main objective of this research is to determine the effectiveness of an educational intervention on the knowledge of foot care in patients with diabetes mellitus.

## Materials and Methods

An educational intervention study before and after was carried out in the Family Medicine Unit #27, of the Instituto Mexicano del Seguro Social (IMSS), located in Tijuana, Mexico; in patients which were selected by a consecutive sampling techniques; that met the following inclusion criteria: age between 20-70 years, with at least three years of evolution with DM, any sex, that accepted and signed an informed consent; patients with a history of diabetic foot or diabet IMSS were not included and eliminated those who did not complete the educational intervention or those with incomplete information.

The following data were obtained directly from the patients or medical records: age, sex, marital status, scholarship, level of self-care knowledge of the feet. The procedure for the data collection was as follows: age was calculated in years according to the year of birth, sex was determined by the phenotype characteristics of each individual, marital status was expressed by each patient, scholarship was determined by asking directly to patients, level of self-care knowledge of the feet was evaluated according to the Foot Care Confidence Scale (FCCS) in Spanish, which has an internal consistency (Cronbach's alpha) of 0.782, this instrument has 12 questions on Likert scale, a high score means a better knowledge of foot care (Figure 1). The educational intervention was divided into six sessions (Table 1), with groups of 10 individuals; each session lasted 20-30 minutes once per week.

The recollected data was integrated into data collection sheets and analyzed using the SPSS program version 20 in Spanish, where we applied descriptive statistics; for qualitative variables, frequencies and percentages were used and for quantitative variables, mean and standard deviation were used. For the bivariate analysis, the Wilcoxon test was used to determinate statistically significant differences between the groups before and after the educational intervention. The Kolmogorov-Smirnoff test was used to establish the normality of the data. It was considered a  $p < 0.05$  as statistically significant, with a 95% confidence interval. The Protocol was authorized by the Local Committee of Research and Ethics in Health Research from the Family Medicine Unit #27, where this study took place.

## Results

We analyzed a sample of 77 patients, of whom 46 (59.7%) were women and 31 (40.3%) men. In the age of participants we found 39% in 50-59 years group, 27.3% in 40-49 and 60-70 years group, 2.6%

**Table 2:** Wilcoxon Test.

Wilcoxon Test		N	Z	p
Postintervention-Preintervention	Negative Rank	0 <sup>a</sup>	-6.905	<0.05
	Positive Rank	63 <sup>b</sup>		
	Ties	14 <sup>c</sup>		
	Total	77		

<sup>a</sup>Postintervention < Preintervention; <sup>b</sup>Postintervention > Preintervention; <sup>c</sup>Postintervention = Preintervention.

in 30-39 years group and 3.9% in 20-29 years group. According to marital status, 7.8% were single, 10.4% free union, 56.1 were married, 5.2% divorced and 15.6% widowers. In scholarship, 61% has primary education, 22.1% secondary education, 10.4% preparatory education and 6.5% bachelor's degree. In time of evolution of DM, 48 participants had between 3 to 5 years with DM and 29 had six or more years with this disease. The following alterations in the feet of the participants were found: 16 calluses, 13 onychocryptosis, 9 venous insufficiency, 8 cutaneous mycosis, 7 loss of sensitivity, 6 edema, 5 thickening of the skin, 4 deformities and 1 viral infection.

When we had the results of the FCCS questionnaire before and after the educational intervention, we performed the nonparametric Wilcoxon test (Table 2) where the presence of 63 positive ranks, 14 ties and 0 negative ranks was found, resulting in a  $Z = -6.905$ , with  $p < 0.05$ , it means that the intervention improved the knowledge of foot care in 81.8% of the participants.

## Discussion and Conclusion

Worldwide, it has been necessary to treat DM with a preventive approach through educational strategies, because this approach prevents vascular complications and can change the perspective and survival of patients. During this study some patients had difficulty due to their visual capacity, mainly in the patients of the age group of 60-70 years, for this reason a partial individualized approach was carried out to help them to answer the tests in their first and last phase. A considerable number of patients already had previous knowledge of foot care, possibly due to counseling given by their family doctor and in some cases because of relatives with a history of diabetic foot and diabetic neuropathy.

In the present study, a minimum number of patients already had symptoms compatible with diabetic neuropathy, so it was necessary to send them to assessment by internal medicine to start treatment. In the evaluation before the intervention, the scores predominated in the high level of knowledge, but when performing the intervention and the subsequent evaluation, we found improvement in the scores

Foot Care Confidence Scale (FCCS)		Nada seguro	Poco seguro	Moderadamente seguro	Bastante seguro	Muy seguro
1	Yo puedo proteger mis pies.					
2	Yo puedo ver mis pies todos los días para revisar si hay cortadas, rasguños, ampollas, enrojecimiento o resequedad, aun sin dolor o molestias.					
3	Yo puedo secarme entre los dedos después de lavar mis pies.					
4	Yo puedo valorar cuando mis uñas de los pies necesitan ser cortadas por un especialista en el cuidado de los pies.					
5	Yo puedo cortarme las uñas de los pies en forma "cuadrada" (de una orilla hacia otra).					
6	Yo puedo darme cuenta cuando usar piedra pómez para suavizar callosidades en mis pies.					
7	Yo puedo probar la temperatura del agua antes de poner mis pies dentro de ella.					
8	Yo puedo usar zapatos y calcetines cada vez que camine (incluyendo dentro de mi casa).					
9	Yo puedo elegir, cuando voy a comprar zapatos nuevos, los que son adecuados para mis pies.					
10	Yo puedo llamar a mi doctor para cualquier problema de mis pies.					
11	Yo puedo verificar el interior de mis zapatos antes de ponérmelos para prevenir cualquier problema o daño a mis pies.					
12	Yo puedo aplicar crema en mis pies de manera rutinaria si me lo recetaran.					

Figure 1: Foot Care Confidence Scale (FCCS) in Spanish.

of the participants, which means a positive impact of the educational intervention. The educational strategies are effective to increase the knowledge of the care of the feet, being cost-effective for a public institution that spends millions of pesos in the management and control of the complications of DM. These interventions increase patients' knowledge and train them to identify early symptoms. The results of the educational intervention were significant and it would be interesting to follow up the patients to assess the long-term impact of the strategy. This strategy allowed for socialization and recreation for the participants, generating a new support group for patients with Diabetes Mellitus.

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