

ORIGINAL ARTICLE

KNOWLEDGE, PRACTICE AND BARRIERS OF DIABETIC FOOT SELF-CARE AMONG INDIVIDUALS WITH TYPE 2 DIABETES MELLITUS

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ABSTRACT

Objective: To relate knowledge, practice and barriers of diabetic foot self-care among people with Type 2 Diabetes Mellitus, according to gender and education. **Method:** Analytical cross-sectional study with 102 users of 4 basic units in the inland of the state of Piauí, Brazil. Socioeconomic and clinical data were collected between December 2018 and July 2019. Descriptive analysis was performed with the use of the Chi-square test. **Results:** Women showed greater knowledge and practice of moisturizing ($p < 0.001$), drying between the toes after bathing ($p = 0.020$), foot hydration with moisturizing creams/oils on the heels ($p < 0.001$), hydration on the sole of the foot ($p = 0.003$) and use of soft and closed-toed shoes ($p = 0.001$); there was frequent use of socks by men ($p < 0.001$) and they were mostly made of cotton ($p < 0.001$). There was an association between educational level and the use of shoes with heels $> 5\text{cm}$ ($p = 0.001$) and $< 5\text{cm}$ ($p < 0.001$). **Conclusion:** It is hoped that this study will allow a new type of approach aimed to the improvement of diabetic foot self-care.

DESCRIPTORS: Diabetic foot; Type 2 Diabetes Mellitus; Complications of Diabetes; Self-care; Knowledge.

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INTRODUCTION

Type 2 Diabetes Mellitus (DM2) is the most common form of the disease, accounting for about 90% of all cases. It is characterized by insulin resistance, i.e. decrease in tissue response to insulin stimulation, which increases glucose levels in the bloodstream. This condition can lead to macro and microvascular impairment, affecting the overall quality of life of the individuals¹.

Diabetic foot² is among the most frequent, expensive and serious microvascular complications. This morbidity is defined as the presence of infection, ulceration and/or destruction of deep tissues associated with neurological abnormalities and vascular disease of the lower limbs³. Local nerve damage characterizes peripheral neuropathy, causing pain, tingling, and loss of sensation, which can lead to serious infections and possible amputations. Thus, people with Diabetes Mellitus (DM) have a higher risk of amputation (25 times greater) compared to healthy people, and the condition is one of the main causes of non-traumatic lower limb amputation^{4,5}.

The incidence of diabetic foot has increased due to the worldwide prevalence of DM and the prolongation of life expectancy of patients with the disease. The overall prevalence of diabetic foot ulcers was 6.3%, being higher among men than among women, and higher in T2DM patients than in Type 1 Diabetes Mellitus patients⁶. However, the increased risk for diabetic foot and, consequently, for amputations can be minimized by professional monitoring through educational activities, aimed at the development of self-care skills, such as, for example, daily inspection of the feet, hygiene, proper use of footwear and adherence to treatment to control the disease^{7,2}.

Self-care is defined as the practice of activities or actions initiated and performed by the individual for their own benefit, with the purpose of satisfying needs and contributing to the maintenance of life, health and well-being⁸. For this practice to be effective, users must be guided on the importance of foot self-care, since diabetic foot has been associated with poor knowledge of foot care. In this regard, it is worth mentioning the guidance on the practice of self-care, and the relevance of the nurse's role, as this professional encourages self-care actions, teaching the correct way to cut the nails (nail shape and appropriate instrument to be used), the type, shape and material the shoes are made of, frequency of self-assessment of the feet, the ideal fabric of the socks and the importance of washing, drying and moisturizing the feet. Moreover, nurses are supposed to recognize the influential behaviors in the execution of self-care practice, address the individual's needs in terms of their chronic condition and propose a planned care during the Nursing Consultation⁹.

Thus, the importance of acquiring knowledge and practice about foot self-care by people with DM2 is justified. Moreover, previous studies^{2,9} that investigated the knowledge and practice of people with DM regarding foot self-care did not analyze such data in association with the variables gender and education, nor with the factors that prevent foot self-care in diabetic individuals, which generated a gap that this study aims to fill.

Therefore, the present study aimed to relate the knowledge, practice and barriers of diabetic foot self-care in individuals with type 2 Diabetes Mellitus according to gender and education.

METHOD

Cross-sectional analytical study that followed the recommendations of the international initiative Strengthening the Reporting of Observational Studies in Epidemiology (STROBE), as it is a key guideline for reporting cross-sectional studies. The study was conducted from

December 2018 to July 2019 in four basic health units (UBS), located in the City of Picos, in the state of Piauí (PI), and participants were selected by a draw. The municipality has 29 UBS with an approximate population of 3,150 users with DM2.

Convenience non-probability sampling was used. The 102 participants were directly recruited at the UBS and the interviews were conducted at that occasion. Individuals registered in one of the four UBS, diagnosed with DM2, associated or not with systemic arterial hypertension (SAH), and aged 18 or over, were included in the study. Individuals with a cognitive deficit that prevented them from providing direct answers to the questions contained in the data collection instruments or related to the assessment of pertinent medical characteristics, such as a hearing, mental, or speech impairment were excluded from the study.

The data collection instrument was a form with questions related to the knowledge and self-care practice of DM patients regarding the prevention of foot injuries¹⁰. It includes 42 questions, with information obtained by self-declaration, inserted in four domains: I - Sociodemographic profile of the subjects; II - Discovering DM; III - Knowledge and practice of diabetic individuals about care of the feet; IV - Barriers and limiting factors for the practice of self-care; and V - Practice of self-care by diabetic individuals regarding the care of the feet. The variables were grouped as follows: socioeconomic, clinical and foot self-care.

Data were processed and analyzed with the aid of the International Business Machines Statistics Package Social Science Version 20.0 (IBM SPSS20.0) and R-version 3.5.1 software for data modeling. Descriptive statistics was used to characterize the sample regarding the sociodemographic and clinical variables, and absolute and relative frequencies of the variables were calculated, in addition to the measures of central tendency and dispersion. Chi-square homogeneity test (22) was used to compare proportions in the association between knowledge and self-care with gender and education. In all tests, a significance level of 0.05 was used, and the corresponding 95% confidence intervals.

The study was approved by the Research Ethics Committee of the Universidade Federal do Piauí (UFPI), according to Protocol no 3,018,155.

RESULTS

The study participants were 102 users, with an average age of 63 ± 11.03 years, of which 09 had an average family income of R \$ $1,652 \pm 893$; 72 (70.6%) were female; 63 (61.8%) were married; 44 (43.1%) had complete elementary school; 72 (55.4%) were retired and lived with their husbands 44 (33.3%). Regarding clinical characteristics, time elapsed since diagnosis of DM2 had a mean of 8.41 ± 7.55 years; Body Mass Index with a mean of 26.7 ± 4.7 kg/m²; systolic and diastolic blood pressure with a mean of 129.02 ± 16.9 and 77.8 ± 10.5 mmHg respectively; also, SAH was the most representative comorbidity: 76 individuals (74.5%) were affected; 41 (40.2%) discovered they had DM2 through routine examinations; 56 (54.9%) of the participants did not check capillary blood glucose regularly, sometimes testing their levels less frequently than every month, and all participants (102) used oral hypoglycemic agents (100%).

The percentages of knowledge and practice of foot self-care of the study sample are described in Table 1.

Table 1 - Knowledge and practice of foot self-care of the study sample. (n=102). Picos, PI, Brazil, 2019

Variables	n	%
What do you do to take care of your feet?		
Wash	102	100
Dry	77	75.5
Moisturize	61	59.8
Massage	05	4.9
How often do you wash your feet?		
Never	02	2.4
Once a day	10	9.8
Twice a day	20	19.6
More than twice	70	68.6
Do you dry the interdigital spaces between the toes		
Yes	38	37.3
No	64	62.7
Do you know any kind of home care for feet?		
Use of cold substances	08	7.8
Use of hot substances	11	10.8
Remedies for calluses	-	-
Plants	03	2.9
Others	102	100
Type, shape and material of shoes that can be worn by a diabetic person		
Type	24	23.5
Shape	08	7.8
Material	12	11.8
What shoes do you usually wear?		
Open- sandal type	94	92.2
Soft, closed-toed	52	51
Heel higher than 5 cm	02	2
Heel height less than 5 cm	04	3.9
No heel at all	79	77.5
You inspect your shoes before wearing them		
Always	46	45.1
Sometimes	24	23.5
Rarely	10	9.8
Never	22	21.6
You usually clean your shoes		
Always	56	54.9
Sometimes	31	30.3
Rarely	7,0	6.9
Never	01	0.9
Other	7	6.8
Do you often cut your nails?		
Yes	101	99
No	01	1
What is your nail cut?		
Rounded shape	78	76.5

Straight line	24	23.5
What is the instrument used to cut the nails?		
Tipped scissor	48	47.1
Blunt scissor	05	4.9
Pocket knife	51	50
Others	11	10.8
Do you usually wear socks?		
Always	16	15.7
Sometimes	26	25.5
Rarely	09	8.8
Never	51	50
Fabric of the socks		
Wool	02	2
Cotton	38	37.3
Synthetic	08	7.8
Other	54	53.2
Do you perform self-assessment of the feet?		
Yes	74	72.5
No	28	27.5
How often do you check your feet?		
Always	24	23.5
Sometimes	43	42.2
Rarely	6	5.9
Never	27	26.5
When you remember that it is necessary	02	2

Source: research data

Regarding the analysis of the association between the variables knowledge and practice of self-care and the gender of the participants in the sample, it was found that women had greater knowledge and practice in moisturizing ($p < 0.001$), drying interdigital spaces between the toes after bathing ($p = 0.020$), applying a moisturizer (cream or oils) on the heels ($p < 0.001$), moisturizing the foot sole ($p = 0.003$) and use of close-toed and soft shoes ($p = 0.001$); in turn, men always wear socks ($p < 0.001$), usually made of cotton ($p < 0.001$), and they were more aware than women about the material the shoes are made of ($p = 0.019$) as shown in the Table 2.

Table 2 - Analysis of the association between knowledge and practice variables versus gender of the study sample (n=102). Picos, PI, Brazil, 2019

Variables	GENDER				p* value
	M		M		
	n	%	n	%	
Washes	72	70.6	30	29.4	*
Dries	55	53.9	22	21.6	0.744

Moisturizes	53	52.0	08	7.8	< 0.001
Massages	04	3.9	01	01	0.636
How often the individual washes his/her feet					
Never	01	01	01	01	0.303
Once a day	05	4.9	05	4.9	
Twice a day	13	12.7	07	6.9	
More than twice a day	53	52.0	17	16.7	
Dries the feet after bathing	54	52.9	22	21.6	0.860
Dries the interdigital spaces between the toes after bathing	32	31.4	6.0	5.9	0.020
Applies moisturizers (creams or oils) on the heels	52	51.0	8.0	7.0	< 0.001
Applies moisturizer on the foot sole	35	34.3	5.0	4.9	0.003
Inspects the inside of shoes before wearing them	29	28.4	16	15.7	0.226
Always cuts the nails straight	19	18.6	4.0	3.9	0.151
Cuts the nails with blunt scissors	3.0	2.9	1.0	1.0	0.843
Makes use of a moisturizer for the feet?					
Yes	39	38.2	05	4.9	< 0.001
No	19	18.6	22	21.6	
Knows the type of footwear					
Yes	16	15.7	08	7.8	0.630
No	56	54.9	22	21.6	
Knows the shape of the footwear (shoes)					
Yes	05	4.9	03	2.9	0.601
No	67	65.7	27	26.5	
Regarding the footwear: knows the material the shoes are made of					
Yes	05	4.9	07	6.9	0.019
No	67	65.7	23	22.5	
Shoes commonly used					
Open, of sandal type	69	67.6	25	24.5	0.032
Closed-toed and soft	29	28.4	23	22.5	0.001
No heels	62	60.8	17	16.7	0.001
Others	04	3.9	07	6.9	0.008
Usually wears socks					
Always	05	4.9	11	10.8	< 0.001
Sometimes	13	12.7	13	12.7	
Rarely	17	16.9	02	02	
Never	47	46.1	04	3.9	
Fabric of the socks					

Wool	01	01	01	01	<0.001
Cotton	17	16.7	21	20.6	
Synthetic	04	04	04	3.9	
Others	50	49	04	3.9	

* Chi-square test
Source: research data

As for the association between the variables knowledge and education of the participants in the study sample (Table 3), there was a significant association between the variables education and footwear, habitual use of heels higher than 5 cm ($p=0.001$), heels less than 5 cm ($p<0.001$) and no heels ($p=0.026$); cleaning shoes sometimes ($p=0.014$) and instrument that cuts nails (blunt scissors) ($p=0.006$).

Table 3 - Analysis of the association between the variables knowledge and education of the study sample (n=102). Picos, PI, Brazil, 2019

Variables	Education										P value *
	Illiterate		Complete Primary Education		Secondary Education		Incomplete Higher Education		Complete Higher Education		
	n	%	n	%	n	%	n	%	n	%	
Washes	36	35.3	44	43.1	16	15.7	03	2.9	03	2.9	**
Dries	25	24.5	32	31.4	15	14.7	02	02	03	2.9	0.300
Moisturizes	20	19.6	28	27.5	08	7.8	02	02	03	2.9	0.516
Massages	02	02	02	02	-	-	-	-	01	01	0.183
Regarding the footwear, knows the shape											
Yes	04	3.9	01	01	03	2.9	-	-	-	-	0.234
No	32	31.4	43	42.2	13	12.7	03	2.9	03	2.9	
Regarding the footwear, knows the material shoes are made of											
Yes	04	3.9	04	3.9	04	3.9	-	-	-	-	0.431
No	32	31.4	40	39.2	12	11.8	03	2.9	03	2.9	
Shoes commonly used											
Open-of sandal type	14	33.3	41	40.2	13	12.7	03	2.9	03	03	0.483
Closed-toed and soft	16	15.7	23	22.5	10	9.8	01	01	02	02	0.706
Heel higher than 5 cm	-	-	-	-	01	01	-	-	01	01	0.001
Heel less than 5 cm	-	-	01	01	01	01	-	-	02	02	< 0.001
No heel	32	31.4	34	33.3	09	8.8	03	2.9	01	01	0.026
Usually cleans the footwear											

Always	21	20,6	24	23.5	07	6.9	01	01	03	2.9	
Sometimes	14	13.7	17	16.7	07	6.9	-	-	-	-	0.014
Rarely	-	-	03	2.9	02	02	02	02	-	-	
Instrument used to cut the nails											
Tipped scissors	15	14.7	22	21.6	9	8.8	01	01	01	01	0.814
Blunt scissors	01	01	-	-	3.0	2.95	01	01	-	-	0.006
Pocket knife	19	18.6	25	24.5	5.0	4.9	-	-	02	02	0.164
Others	04	3.9	03	2.9	03	2.9	01	01	-	-	0.444
Cuts nails with blunt scissors	01	01	-	-	01	01	01	01	-	-	0.017

* Chi square test. ** Test calculation is impossible
 Source: research data

The most frequent factor that prevented foot self-care was lack of knowledge about essential foot care, reported by 42 (41%) participants, as shown in Figure 1.

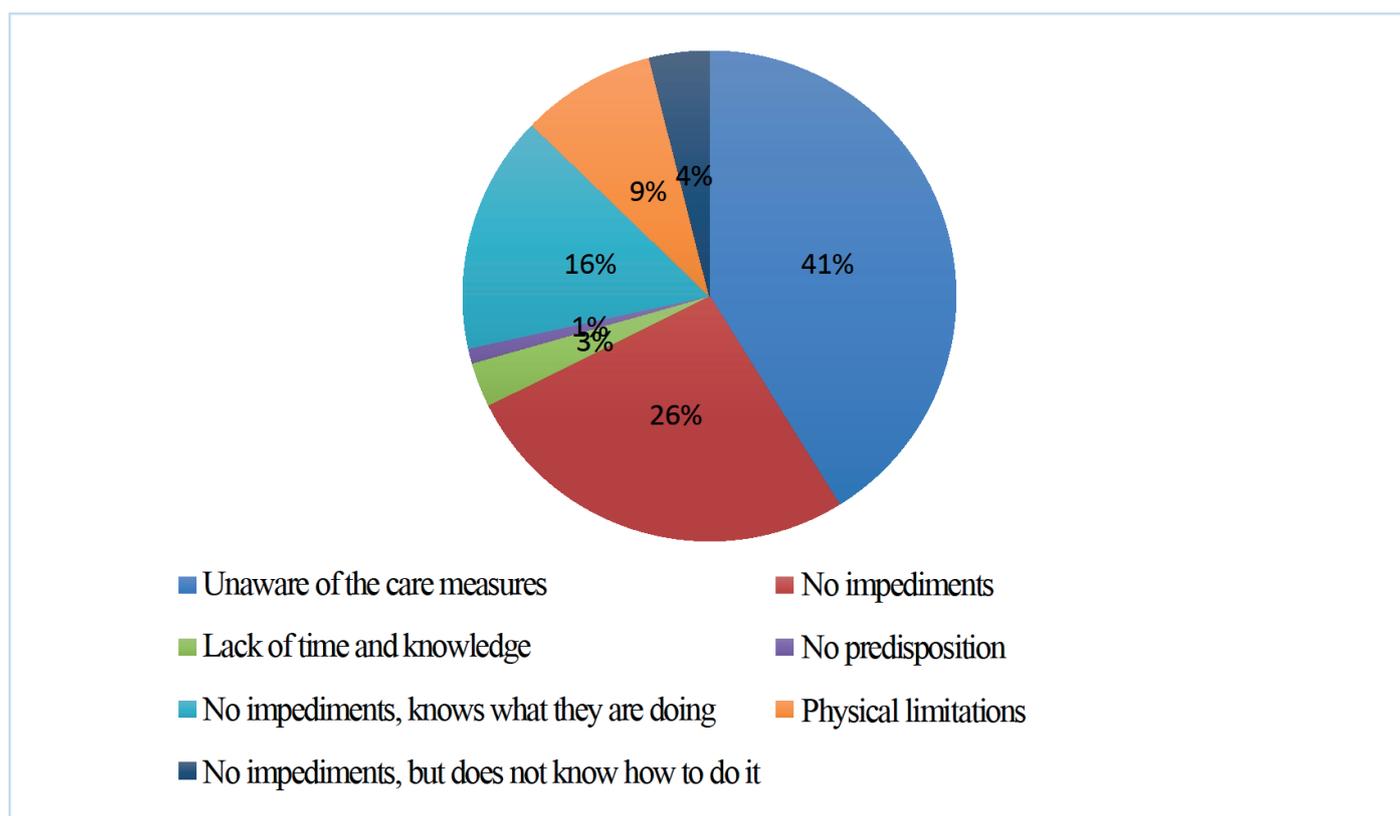


Figure 1 - Factors that prevented foot self-care by the participants of the study. Picos, PI, Brazil, 2019. Source: the authors (2019).

DISCUSSION

This study's sample consisted predominantly of women, with an average age of 63 years and regarding marital status, they lived with a partner, data that corroborate other

studies carried out with UBS users with DM¹¹⁻¹³. Also, most participants did not perform tests to assess glycemic control, and it is known that glycemic changes over the years can lead to complications such as retinopathy, neuropathy and nephropathy¹². Poor knowledge about the management of DM contributes to this finding, since individuals with higher educational level tend to have better glycemic control¹⁴.

In the assessment of knowledge and foot self-care practices, it was found that all participants washed their feet (100%). Of these, 68.6% washed them more than twice a day; most moisturized their feet (59.8%) and dried them (75.5%). However, many participants reported that they did not dry the interdigital spaces between the toes (62.7%). The practice of such foot care is important to prevent skin dryness and the appearance of cracks, which are gateways for the development of infectious processes and the onset of tissue injuries¹⁵. Such care can reduce the risk of infection and, consequently, the development of diabetic foot, which is one of the main causes of lower limb amputations¹⁶. Therefore, knowledge of the patient with DM about foot care is essential to minimize the occurrence of complications.

However, a tiny percentage of the participants used massage (4.9%), failing to obtain several benefits from this practice, since a systematic review showed that there was an improvement in skin blood flow ($p < 0.05$), a significant decrease in fasting and postprandial glucose, glycated hemoglobin, decreased duration of treatment for foot ulcers ($p = 0.001$), reduced neuropathic pain ($p < 0.001$) and increased quality of life after massages ($p = 0.02$). Thus, massage can be useful in the prevention of diabetic foot and as part of the non-mediated treatment of DM¹⁷.

In the present study, most participants were unaware of the type (76.5%), shape (92.2%) and material (88.2%) of the footwear that can be worn by people with DM. As for the shoes they usually wear, most participants reported wearing open-toed sandals (92.2%), an inappropriate practice that can increase the risk for diabetic foot ulcers. In people with DM and loss of protective sensation in the feet, the use of inappropriate footwear is one of the main causes of trauma that leads to ulceration. Thus, all shoes must be adaptable to any structural or biomechanical foot disorders in DM patients⁷.

This attitude is due to the lack of knowledge about the use of proper footwear. It should be emphasized that this lack of knowledge contributes to harmful practices and increases the risk of foot injuries in individuals with reduced sensitivity^{1,9}.

Regarding the inspection of shoes before wearing them, it was found that although the number of participants who performed such inspection was not satisfactory (45.1%), it is considerably high compared to data from a study in India with 400 participants, in which this practice was performed by only 5% of the study sample, demonstrating that foot care was the most neglected aspect¹⁸. Almost all the subjects (99%) cut the toenails, but they did it in an inappropriate way, as most individuals cut their nails in a rounded shape (76.5%) and with blunt scissors (47.1%), practices that are not recommended, as they can cause foot ulcers^{12,15}.

Regarding the use of socks, the recommendation of the International Diabetic Foot Group is the use of socks without seams, not tight, below the knee, and should be changed every day⁷. However, in this study, most participants never wore socks (50%).

Many participants performed foot self-exams only 43 (42.2%) sometimes, and they should do it always. Identification of risk factors, periodic inspection and exams of the feet are part of the five key elements of the efforts to prevent ulcers in the lower limbs⁷. Thus, the role of health professionals in the stimulation and training of users with DM regarding foot self-exam is essential.

DM self-management education is the main tool for ensuring self-care. The main objectives of this practice are to reduce barriers between individuals who have the disease and their families, communities and health professionals; empower individuals for self-care;

improve clinical outcomes; help prevent the acute and chronic complications of DM and provide a better quality of life¹⁹.

A quasi-experimental study carried out with 57 people living with DM2 provided knowledge about the positive repercussions of contact with educational interventions for self-care. Thus, significant improvements in adherence to self-care skills based on participation in health education activities were observed²⁰.

The implementation of self-care measures in this study was influenced not only by knowledge, but also gender, since women had more adequate knowledge and practice related to foot self-care than men. Drying the interdigital spaces between the toes after bathing, applying a moisturizer (creams or oils) on the heels and soles of the feet predominated among women. Likewise, regarding the use of close-toed and soft shoes, daily inspection of the inside of shoes before wearing them, cutting the nails always straight and using blunt scissors as a cutting instrument, there was a predominance of women over men.

Men are less likely to have self-care attitudes, which is related to cultural issues historically rooted in a patriarchal society where such attitudes are associated with fragility²¹.

As for the participants' educational level and its association with the knowledge and practice of foot self-care, it was found that individuals who have completed elementary education had more knowledge and adopted more appropriate practices compared to illiterate people. These two groups were the most representative in this study.

It is known that factors such as a lower educational level, a vulnerable socioeconomic situation and lack of knowledge of foot care contribute to improper practices, which increases the risk of developing neuropathy²². In this scenario, a low educational level can make it difficult for users to understand the essential care needed to control the disease and prevent complications²³.

Knowledge and practice of foot self-care of individuals with DM2 is deficient/inadequate for some variables. Hence, investments are needed in public policies aimed to raise awareness of the importance of adopting measures to prevent ulcers, training health professionals, especially nurses, who play a fundamental role in the guidance and health education of users.

One limitation of this study is the cross-sectional design that investigates only a short period of time, and thus generalization of the results is not possible. Therefore, further studies on the subject in other regions of the country are recommended to identify the knowledge, practice and barriers of foot self-care in individuals with DM2.

CONCLUSION

Men are less likely to adopt foot self-care practices than women due to sociocultural issues of the patriarchal society. Therefore, public health policies and professionals should focus more on men, in order to ensure better care to the male population with DM2. It was found that individuals who have completed elementary education are more likely to adopt adequate self-care measures compared to illiterate people. Thus, when approaching these users, health professionals must make sure they understand the procedures involved in foot self-care.

Regarding the implications for the clinical practice of nurses in Primary Care, it is expected that this study will allow a new approach during nursing consultations, as well as in the planning and implementation of educational actions, aiming at the acquisition and improvement of self-care behaviors, such as the use of diabetic foot risk assessment instruments/tools.

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