

ORIGINAL ARTICLE

**NURSE'S KNOWLEDGE ABOUT CARING FOR DIABETIC FOOT\***  
**CONHECIMENTO DO ENFERMEIRO ACERCA DOS CUIDADOS COM O PÉ DIABÉTICO**  
**CONOCIMIENTO DE LOS ENFERMEROS SOBRE EL CUIDADO DEL PIE DIABÉTICO**

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**ABSTRACT**

**Objective:** to understand nurses' knowledge about diabetic foot care in Primary Care. **Method:** this is a quantitative, descriptive, cross-sectional study with 90 nurses from the Family Health Strategy / FHS, using a questionnaire and the Likert scale, which was analyzed by Mann-Whitney U, Kruskal-Wallis and p from Spearman. The level of significance was set at 5% and the confidence interval of 95%. **Results:** it was observed that no nurse had satisfactory knowledge for the prevention of diabetic foot and, regarding the self-assessment of knowledge, 48.9% of nurses considered it regular. It was found, when analyzing the items on the prevention of diabetic foot, better performance for monofilament and neuropathic foot, with lower performance for physical examination; regarding the classification of knowledge, the professionals presented unsatisfactory (45.6%) and conflicting (54.4%) knowledge. **Conclusion:** it was identified unsatisfactory knowledge for nurses regarding the care of diabetic foot, highlighting the need to update professionals for educational practices regarding the assessment of feet. **Descriptors:** Knowledge; Nursing; Primary Prevention; Diabetic Foot; Primary Attention; Family Health Strategy.

**RESUMO**

**Objetivo:** compreender o conhecimento do enfermeiro acerca dos cuidados com os pés de diabéticos na Atenção Primária. **Método:** trata-se de estudo quantitativo, descritivo, transversal, com 90 enfermeiros da Estratégia Saúde da Família/ESF, utilizando-se um questionário e a escala *Likert* em que a análise se deu por U de Mann-Whitney, Kruskal-Wallis e p de Spearman. Adotou-se o nível de significância nas análises de 5% e o intervalo de confiança de 95%. **Resultados:** observou-se que nenhum enfermeiro apresentou conhecimento satisfatório para a prevenção do pé diabético e, acerca da autoavaliação do conhecimento, 48,9% dos enfermeiros o consideravam regular. Verificou-se, ao analisar os itens sobre a prevenção do pé diabético, melhor desempenho para o monofilamento e pé neuropático, com menor desempenho para exame físico; quanto à classificação do conhecimento, os profissionais apresentaram conhecimento insatisfatório (45,6%) e conflitante (54,4%). **Conclusão:** identificou-se conhecimento insatisfatório para os enfermeiros quanto aos cuidados com o pé diabético, destacando-se necessária atualização dos profissionais para as práticas educativas quanto à avaliação dos pés. **Descritores:** Conhecimento; Enfermagem; Prevenção Primária; Pé Diabético; Atenção Primária; Estratégia Saúde da Família.

**RESUMEN**

**Objetivo:** comprender el conocimiento de los enfermeros sobre el cuidado del pie diabético en Atención Primaria. **Método:** este es un estudio cuantitativo, descriptivo, transversal con 90 enfermeros de la Estrategia de Salud Familiar / FHS, utilizando un cuestionario y la escala *Likert* en la que el análisis fue realizado por Mann-Whitney, Kruskal-Wallis y p de Spearman. El nivel de significación se estableció en 5% y el intervalo de confianza del 95%. **Resultados:** se observó que ningún enfermero tenía un conocimiento satisfactorio para la prevención del pie diabético y, con respecto a la autoevaluación del conocimiento, el 48,9% de los enfermeros lo consideraban regular. Se encontró, al analizar los ítems sobre la prevención del pie diabético, un mejor rendimiento para el monofilamento y el pie neuropático, con un rendimiento inferior para el examen físico; en cuanto a la clasificación del conocimiento, los profesionales presentaron conocimientos insatisfactorios (45,6%) y conflictivos (54,4%). **Conclusión:** se identificó un conocimiento insatisfactorio para los enfermeros con respecto al cuidado del pie diabético, destacando la necesidad de actualizar a los profesionales para las prácticas educativas con respecto a la evaluación de los pies. **Descriptor:** Conocimiento; Enfermería; Prevención Primaria; Pie diabético; Atención Primaria; Estrategia de Salud Familiar.

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## INTRODUCTION

Diabetes Mellitus (DM) has stood out among chronic diseases due to the increasing prevalence and increased morbidity and mortality associated with it. Diabetic foot is known to be the final event of chronic complications of DM and the main pathophysiological factors of ulceration and lower limb infections include diabetic neuropathy, plantar pressure and trauma.<sup>1</sup>

Most ulcer admissions are due to diabetics, which are the main complication of the disease, affecting mainly the lower limbs. It is reported that ulcers affect up to 15.0% of diabetics in developed countries, accounting for six to 20.0% of hospitalizations, highlighting that about 85.0% of amputations are preceded by ulcers.<sup>2</sup>

It is understood that Primary Care is the gateway to the integral care of people, classified as primary care, ie, where the first contact with the patient happens, being responsible for the longitudinal, integral and coordinated care of their enrolled population. Thus, it is necessary to organize the access of people under their responsibility, especially those with Diabetes Mellitus.<sup>3</sup>

It is understood that, as an important member of the multidisciplinary team of Primary Care, nurses have represented a field of growth and social recognition, as it is an active component in the process of consolidating the strategy as an integrative and humanized health policy, as well as a professional who is indispensable in health promotion and prevention, self-care and therapeutic management in the care of Diabetes Mellitus.<sup>4</sup>

Although the Brazilian guidelines, manuals and protocols have emphasized the importance of nurses in the actions for the prevention of diabetic foot disorders in people with diabetes mellitus that, in the work process of some professionals, these actions do not have developed in everyday life. In this context, it is warned that the physical examination of the feet has often not been performed by professionals for various reasons, such as lack of knowledge, lack of infrastructure and excessive demand. In their work, the nurse has prioritized exams, medical consultations, investigation and appreciation of adherence to pharmacological treatment and supervision of technicians in procedures (wound dressing).<sup>5</sup>

However, health professionals should act broadly, ranging from clinical practices of monitoring, metabolic control and treatment, to the implementation of effective preventive measures, such as the recognition of risk factors and the encouragement of self-care practices, made possible through educational activities with guidance on the importance of daily inspection and proper foot hygiene.<sup>6</sup>

The person with diabetic foot faces daily major economic, social, cultural, emotional and biological impact, which includes expenses with hospitalizations, treatments and physical disabilities, with repercussions on their self-care and quality of life. It is essential, at this juncture, considering the high incidence and complications of the disease, that health professionals, especially nurses, expand their attention and care for people with diabetes mellitus.<sup>5</sup> In the face of the problem, the following problem question was formulated: "What is the nurse's knowledge about diabetic foot care in the Family Health Strategy?"

This study emphasizes the importance of knowledge assessment as an instrument capable of identifying the gaps and the results of the actions developed by nurses in Primary Health Care and, thus, awakening reflection in the scientific community and professionals, a reflection about improving preventive care for the pathology, contributing to the reformulation of strategies and / or actions that provide comprehensive care, minimizing complications such as amputations. Health service managers, in particular, primary care, are also warned about the need for training of professionals, aiming to achieve better care for people with diabetes and the reduction of high health costs, arising from the aggravation of cases.

## OBJECTIVE

- To understand nurses' knowledge about caring for diabetic foot, in Primary Care.

## METHOD

This is a quantitative, descriptive, cross-sectional study, conducted from August to December 2017, with nurses from the Family Health Strategy / FHS, in the municipality of Teresina-PI, Northeast Brazil.

Data was provided by the Municipal Health Foundation, through the National Registry System of Health Establishments. The city's health management was constituted during data collection by 90 Basic Health Units, distributed in urban and rural areas, among the regional health South, Center-North and East-Southeast, and among them 260 Family Health Strategy teams, with 237 in the urban area and 23 in the rural area, one nurse for each strategy.

The population consisted of 237 male and female nurses from the urban area, for easy access to health units and professionals.

The formula for cross-sectional studies with a finite population was used to obtain the sample universe, considering as parameters the prevalence of knowledge about the prevention of diabetic foot of  $p = 0.50$  ( $p = 0, 50$ , because the

prevalence of nurses' knowledge was unknown, thus obtaining a conservative size, that is, larger than necessary to ensure the accuracy imposed);<sup>7</sup> the significance level of  $\alpha = 5\%$  ( $z_{\alpha/2} = 1.96$ ); the maximum tolerable error of  $d = 9\%$  and the universe of  $n = 237$ . The sample size resulted in 80 participants; however, considering a 10.0% rate of information loss through incomplete and / or unanswered answers, the final size totaled 90 nurses. Stratified probabilistic sampling among the three health regions was used to select the participants.

It was considered as inclusion criteria to be in full exercise of assistance in the selected health strategy. Nurses who were on vacation or on leave were excluded. Then, the basic units were selected by lot, using the free software "R", and the participants were recruited from the selected health units until completing the sample.

Data was collected by the researcher herself, in the Basic Health Units, in a private place (Nursing practice), with prior appointment with the manager of the health post or nurse. The collection instrument was given to the nurse to answer it, with an average duration of 25 minutes. The semistructured questionnaire addressed socioeconomic data, professional profile and knowledge about the prevention of diabetic foot: physical examination of the feet; neurological assessment tools (Semmes-Weinstein ten-gram monofilament (5.07 U); 128Hz tuning fork; hammer (reflex / neurological) and classification for diabetic foot (neuropathic and ischemic foot). knowledge through the guidelines and care recommended by the manuals of the Ministry of Health and Guidelines of the Brazilian Society of Diabetes.<sup>3,8-9</sup>

To assess nurses' knowledge about the prevention of diabetic foot, 24 items were characterized by positive and negative statements about physical examination of the feet, neurological assessment tools and classification of diabetic foot. As an evaluation measure, the adapted Likert Scale was used, with five points that inferred the intensity of agreement or disagreement, according to the following scheme: 1. Strongly disagree: does not apply the described basis; 2. Partially disagree: does not apply the ground described in the majority; 3. Indifferent: There are doubts whether the ground is applied in the majority or minority; 4. I partially agree: most of the plea described in the statement applies; 5. Strongly Agree: The plea set out in the statement fully applies.<sup>10-1</sup>

Thus, for the analysis of the results, it is explained that the answers to the items that expressed positive ground received a value from one to five, according to the intensity of the agreement expressed by the research subjects;

similarly, responses to items expressing a negative foundation were scored from one to five, in the opposite direction. A very agreed answer was coded as "1" and a very disagreed answer as "5".<sup>12</sup> Total scores were obtained for each individual by summing the scores of each of the 24 items.

The questionnaire score was varied from 24 points (24 items multiplied by value 1 when marked strongly disagree) to 120 points (24 items multiplied by value 5 when marked strongly agree). The sum of the points obtained on the scale was classified as a qualitative variable from the following terms: unsatisfactory (24 to 71 points), conflicting (72 to 95 points) and satisfactory (96 to 120 points). The classification for conflicting knowledge corresponded to the scores in which professionals, most of the time, answered the statements with the indifferent option, which characterizes the conflict of ideas regarding the described foundation.<sup>13</sup>

To test the data collection instrument, a pilot study was conducted with ten randomly selected participants. The pilot study aimed to verify the adequacy, comprehension and reliability of the data collection instrument.

Data was organized in Microsoft Excel and processed in free software R, version 3.4.0, where statistical measurements were calculated. To test the normality of the data, the Shapiro-Wilk test was used, which attested to the non-normality of the data. To compare quantitative variables within the levels of qualitative variables, the nonparametric Mann-Whitney U (two groups) and Kruskal-Wallis (more than two groups) tests were used, followed by the middle ranks (MR). The nonparametric Spearman test  $\rho$  was also applied to verify the correlation. The level of significance was adopted in the analyses of 5%, parallel to a confidence interval of 95%.

The study was approved by the Research Ethics Committee of the Federal University of Piauí, Opinion No. 2.075.935 / 17 and Certificate of Presentation for Ethical Appreciation No. 63553716.0.0000.8057.

## RESULTS

Ninety nurses participated in the study, 82 (91.1%) female and eight (8.9%) male, with a mean age of 41.2 years ( $\pm 10.6$ ) and income. average family member of R \$ 9,424.00 ( $\pm 3,943.8$ ). In addition, 53 (58.9%) prevailed as self-reported brown skin color, and, regarding marital status, 53 (58.9%) were married and belonging to the B2, 33 (36.7%) economic class.

For the professional profile of nurses, nurses' training time of 15.9 years ( $\pm 9.7$ ) and length of service in the Family Health Strategy of 10.5 years ( $\pm 6.8$ ) stood out. predominantly for training in public institutions; Regarding the highest degree,

69 (76.7%) nurses had a specialization course and 56 (62.2%) reported not having participated in courses and / or training on diabetic foot; Regarding the use of a protocol for the assessment of diabetic foot, 71 (78.9%) did not use a protocol for the assessment of diabetic foot and 15 (16.7%) reported using the Ministry of Health manuals for foot care.

It was also found that 81 (90.0%) participants did not develop studies on the subject and 78 (86.7%) revealed not participating in scientific research groups. Regarding the self-assessment of knowledge about foot care of the person with diabetes, 44 (48.9%) nurses considered.

Table 1 shows the evaluation of the set of items regarding nurses' knowledge for the prevention of diabetic foot, showing an average of 72.2 points ( $\pm$  6.9). When analyzing the items individually, an average of 66.0 points for physical examination of

the feet was identified. For the item diabetic foot assessment instruments, the highest average for monofilament 10g Semmes-Weinstein with 74.9 points were presented, and for the diabetic foot classification item, the highest average for knowledge about the foot, with 90.4 points, highlighting a lower average point for the item of knowledge about the physical examination of the feet.

Nurses' knowledge was classified according to the score obtained in the sum of the 24 items, using the average as the cutoff point for the knowledge classification, which was conflicting for 49 (54.4%) nurses and unsatisfactory for 41 (45, 6%) participants. It is noteworthy that nurses did not score more than 95 points and, therefore, there was no frequency for satisfactory knowledge, according to the instrument used.

Table 1. Description of the score obtained by nurses regarding knowledge items for the prevention of diabetic foot. Teresina (PI), Brazil (N = 90).

Knowledge Items for Diabetic Foot Prevention	Score obtained		
	Average	SD	Median
Physical examination of the feet	66.0	14.0	64.5
Instruments for neurological assessment			
Semmes-Weinstein Monofilament	74.9	14.9	72.0
128hz tuning fork	74.4	10.0	72.0
Neurological hammer / reflex	67.7	15.7	72.0
Diabetic foot classification			
Neuropathic foot	90.4	17.3	88.0
Ischemic foot	67.1	21.3	64.0
Total Sum of Items	72.2	6.9	72.0

SD: Standard deviation.

When verifying the association between the professional profile and the score obtained in the statements about the nurse's knowledge, table 2 shows the statistical significance regarding the institution of training ( $p = 0.011$ ), use of protocol for diabetic foot evaluation ( $p = 0.018$ ) and self-assessment of knowledge for foot care ( $p = 0.007$ ); Regarding this last variable, the group with very good knowledge differed significantly ( $p = 0.010$ ) from the group with regular knowledge (MR = 66.9, PM = 36.3) and the group with good knowledge differed significantly ( $p = 0.004$ ) from the group with regular knowledge (MR = 52.7, MR = 36.3).

There was also a negative correlation between the score and the variables age ( $\rho = -0.40$ ,  $p = 0.001$ ), time since graduation ( $\rho = -0.34$ ,  $p = 0.002$ ) and service in the Family Health Strategy ( $\rho = -0.33$ ,  $p = 0.002$ ), highlighting that the older the age and the time of training and service, the lower the score obtained in the knowledge questions. It is pointed out that there was no statistically significant association for socioeconomic data.

Table 2. Relationship of professional profile variables with the score obtained in the statements about nurses' knowledge for the prevention of diabetic foot. Teresina (PI), Brazil (N = 90).

Variables	Statistics				Middle Post	p-value
	Average	Median	Minimum	Maximum		
Training institution						
Public	71.0	70.0	55.0	94.0	40.8	0.011 <sup>u</sup>
Private	74.8	75.0	62.0	89.0	56.0	0.011 <sup>u</sup>
Diabetic Foot Classification Protocol						
Yes	77.0	77.0	63.0	94.0	57.3	0.018 <sup>u</sup>
No	71.2	71.0	55.0	85.0	40.6	0.018 <sup>u</sup>
Knowledge about diabetic foot						
Great <sup>ac</sup>	73.7	78.0	63.0	80.0	54.0	0.007 <sup>k</sup>
Very good <sup>ab</sup>	77.4	77.0	72.0	85.0	66.9	0.007 <sup>k</sup>
Good <sup>ab</sup>	74.2	75.0	59.0	94.0	52.7	0.007 <sup>k</sup>
Regular <sup>c</sup>	69.8	69.0	55.0	85.0	36.3	0.007 <sup>k</sup>

<sup>u</sup>: Mann-Whitney U Test; <sup>k</sup>: Kruskal-Wallis test; <sup>a,b,c</sup>: Different letters indicate statistical difference between groups.

Regarding the use of other instruments to evaluate the feet, according to the degree of importance, 53 (58.4%) nurses used some instrument to evaluate the feet. It is noted that the instruments most used by professionals were the ballpoint pen (96.2%), cotton (90.4%) and the glass with water (90.4%). For the most important instrument (grade 3) in the evaluation of the feet, the glass with water, (40.4%) and the least relevant (grade 0), the stylet (48.1%), were registered.

## DISCUSSION

This study presents limitations related to data collection made only with nurses of the Family Health Strategy of the urban zone, due to the easy access and larger number of nurses, which did not allow the gathering of information from other areas of the city, as well as the non-participation of some professionals, due to lack of time and accumulation of activities, redefining the sample size, besides being a cross-sectional study, where it was not possible to follow longitudinally the preventive care outcomes performed by nurses in the assessment of the feet.

It is believed that the study contributes to identify the need for training and / or training of professionals to make preventive measures more effective and routine in primary care.

Regarding the self-assessment of knowledge about the prevention of diabetic foot, most nurses evaluated the knowledge as regular, presenting consistency with the low qualification in the subject. Similar data for the nurses' knowledge assessment were found in a study conducted in Pakistan, which revealed that 13.0% and 15.0% of the nurses had very low or low knowledge, respectively, and only 14.0% of participants had high levels of knowledge about diabetic ulcer care,<sup>14</sup> reaffirming the need for training in the area to improve care for people with diabetes in Primary Health Care.

When analyzing nurses' knowledge about the prevention of diabetic foot, it was found that the knowledge of the foot care was unsatisfactory, which indicates that the care actions in Primary Health Care are not being adequately and

completely performed as recommended by manuals, guidelines and protocols.

It is cautioned, therefore, that nurses need sufficient knowledge and skills in foot care of people with diabetes to prevent, diagnose and care for complications. It was identified, in a research developed to evaluate the nurses' levels of knowledge about the management of diabetic foot care, that 34.0% of the nurses had information about diabetic foot care and 42.8% needed training.<sup>15</sup>

When assessing the items for nurses' knowledge, the lowest average for the physical examination of the feet was examined. Thus, the lack of knowledge about the care for the physical examination of the feet is a worrying factor for the development of ulcers, which may lead to complications and / or amputations of the lower limbs and, therefore, the evaluation of the feet of users with diabetes should be performed completely and periodically.

Similar data was observed in a study conducted in Turkey, which found that 77.5% of nurses did not perform physical examination of the feet in diabetic patients<sup>15</sup>. It is believed that, according to the data found in this study, the non-compliance with the important steps in the assessment of diabetic feet makes early identification and diagnosis difficult, thus highlighting the need for professional training on the importance of performing the physical examination of the feet and know the pathophysiological aspects, such as the contribution to the quality of care and better quality of life of patients with diabetes.

It is also inferred, regarding the knowledge assessment, that the foot assessment instrument (10g monofilament) was highlighted, which is important in the protective and tactile sensitivity test, and the highest average score for the diabetic foot classification (neuropathic foot), an important factor in specific foot examination, which allows the periodicity of foot follow-up and evaluation to be defined. Regarding the assessment instrument, a study about the implementation of an educational program about foot care on the knowledge, practice and results of nurses in the care of patients with diabetes was

obtained, with different data, where no nurse had experience with the monofilament examination or tuning fork evaluation, which is important for early detection of diabetic foot problems.<sup>16</sup>

When comparing the score obtained by nurses and the professional profile data, it was observed statistical significance for nurses trained in a private institution, who used a protocol for the assessment of diabetic foot (the most cited were the manuals recommended by the Ministry of Health) and who self-rated their knowledge of diabetic foot care as very good. It is believed, with the findings, that the use of protocols that guide the care in the assessment of the feet is efficient in terms of content, since it allows a broader look at the specific examination of the feet, facilitating the knowledge and performance of nurses in the integral approach of the diabetes patient.

It was also verified that, for the score obtained and the title, the highest average was for nurses with specialization and who attended courses and/or training on the subject, however, were not statistically significant. On the other hand, in the research carried out in the interior of the State of São Paulo, there is a scarcity of trained human resources among professionals working in basic health units, considering this factor as one of the main obstacles in the management of diabetes.<sup>17</sup>

There was a negative correlation between the score obtained and the variables age, time since graduation and service in the Family Health Strategy, because the older the age and time, the lower the score obtained in the knowledge questions. It can be inferred from this context that, despite the long experience, accommodation by routines may be interfering with the search for qualification, which impairs the nurse's performance regarding the care of diabetic foot.

It was also evident in this study that most nurses used instruments to evaluate the feet, especially the ballpoint pen, cotton and the glass with water. Therefore, it is clear that some instruments are not part of the routine of nurses and that, in most cases, lack of knowledge about their handling, which may impair the prevention of diabetic foot.

It is stated in the literature that care for patients with diabetes should include a systematic routine to assess the loss of plantar protective sensitivity, with the aid of a 10g monofilament associated with one of four tests (128Hz tuning fork or neurothesiometer to test vibration sensitivity, the pin for the painful sensitivity and the hammer for the Achilles reflex), as well as the vascular evaluation by palpation of the distal pulses. However, it is explained that the use of only one of the evaluations alone will not provide or will not benefit the identification or prevention of diabetic foot.<sup>18</sup>

Preventive practices for self-care should be encouraged by all health professionals, especially the nurse, responsible for care, dealing with the follow-up of the disease. Because of this, diabetes education is trusted as an essential resource and should be composed of activities that facilitate behavioral changes and the adoption of practices that can reduce the risks of the disease.<sup>19</sup>

In this regard, considering the increase in cases of patients with Diabetes Mellitus and the severity of its complications, the importance of deepening the knowledge about this pathology and its prevention forms is important.

## CONCLUSION

It was concluded that the researched nurses presented unsatisfactory knowledge for the assessment items of knowledge about diabetic foot care, with lower performance for items about the physical examination of the feet.

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