








ORIGINAL ARTICLE

ULCERS OR INFECTIONS OF THE LOWER LIMBS IN PEOPLE WITH DIABETES MELLITUS: NURSES' KNOWLEDGE AND PRACTICES*

HIGHLIGHTS

1. Nurses have a low level of knowledge about lower limb ulcers.
2. Care practices for lower limb ulcers or infections.
3. There is a lack of professional training on lower limb ulcers.

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ABSTRACT

Objective: To identify nurses' knowledge and practices related to lower limb ulcers or infections in people with diabetes *mellitus*. **Method:** A qualitative study was conducted with 24 nurses from family health teams in a municipality in the countryside of the State of Minas Gerais – Brazil. Semi-structured interviews were conducted in October and November 2022, analyzed using the thematic analysis technique, and discussed using the literature on the subject. **Results:** The study's findings revealed two crucial thematic categories: "Knowledge about lower limb ulcers or infections in people with diabetes mellitus" and "The work of nurses in caring for people with diabetes mellitus". These findings underscore the urgent need to improve knowledge and practices about ulcers or infections in the lower limbs, emphasizing the pivotal role of nurses in this process. **Conclusion:** The study showed that knowledge and practices about ulcers or infections in the lower limbs are fragile, highlighting the need to build knowledge in the nursing field and encourage the adoption of preventive measures by health professionals, especially primary care nurses.

KEYWORDS: Diabetes *Mellitus*; Diabetic Foot; Prevention; Nursing Care; Primary Care.

HOW TO REFERENCE THIS ARTICLE:

Gonçalves PH, Cardoso AGF, Ribeiro T da S, Matumoto S, Fermino TZ, Fortuna CM, et al. Ulcers or infections of the lower limbs in people with diabetes mellitus: nurses' knowledge and practices. *Cogitare Enferm.* [Internet]. 2024 [cited "insert year, month and day"]; 29. Available from: <https://doi.org/10.1590/ce.v29i0.94957>.

INTRODUCTION

Ulcers or infections of the lower limbs (UILL) are the most impacting complications of Diabetes *Mellitus* (DM), especially when they progress to amputations. These changes in daily activities affect the person's quality of life. In addition, the length of time it takes to treat UILL in the health unit, outpatient clinic, or hospital can negatively impact the quality of life and is associated with high mortality rates¹⁻³.

In Brazil, the prevalence of foot ulcerations in people with DM was 21.0%, and the prevalence of lower limb amputations ranged from 10.0% to 13.0%⁴⁻⁶. During the COVID-19 pandemic, the number of hospitalizations for foot ulcers in people with DM increased⁷.

In Primary Health Care (PHC), preventive actions, health education, early diagnosis, and care are essential public health issues that can reduce unwanted outcomes and properly care for people¹. This calls for a change in care for people with DM through actions that prioritize comprehensive care for people's needs, as opposed to the disease-centered and curative model for the lesions that have been installed⁸.

To care for the problem, nurses must seek practical knowledge and skills. International studies have shown that nurses' knowledge of the subject is inadequate and that care guidelines for people with DM are not satisfactorily followed by these professionals⁹⁻¹⁰. However, even when knowledge is adequate, it can be seen that most nurses have not received training in foot care and have not carried out educational activities or foot examinations of people with DM¹¹.

This evidence indicates the need to strengthen and encourage the production of knowledge in nursing related to the care of IMDUs. Therefore, it is believed that nurses' knowledge and practical skills in caring for people with DM can be an effective solution to prevent UILL, especially in vulnerable communities¹. In Brazil, PHC studies found that nurses' knowledge was unsatisfactory when preventing and detecting the risk of UILL and performing a physical examination of the feet¹²⁻¹³.

Given the above, nursing actions are assumed to weaken knowledge and care practices related to UILL in people with DM. The aim is, therefore, to identify nurses' knowledge and practices related to lower limb ulcers or infections in people with diabetes *mellitus*.

METHOD

A qualitative study. The consolidated criteria for reporting qualitative research (COREQ)¹⁴ described the method. A study was carried out in a small town in the interior of Minas Gerais. The PHC network has 23 health units with 24 Family Health teams (FHS), 23 urban FHS and one rural FHS. Therefore, the study was conducted in 24 FHSs, each with a nurse, totaling a convenience sample of 24 nurses who have worked directly in care for more than six months in these teams. When recruiting participants, there were no refusals or exclusions (nurses in management positions, on vacation, or leave).

The first contact with the participants was by telephone to introduce the research and schedule the interviews. The interviews took place in person at the workplace, following the biosafety regulations for COVID-19, and were carried out between October and November 2022. The interviews lasted approximately 20 minutes. All the interviews were conducted by one of the authors, a postgraduate student familiar with health services. The student was trained by her advisor, who has experience in qualitative research, on communication

techniques (how to ask questions, expressions to delve deeper into the topic, etc.) to interview in an interpersonal way.

A semi-structured interview script drawn up by two of the study's authors was used to collect data, with sociodemographic questions and the following guiding questions: What is your knowledge of diabetic foot? How have preventive actions been carried out in your workplace? What are the greatest difficulties in carrying out preventive practices for diabetic foot? What do you think about training the team in methodological procedures for preventing, guiding, and treating diabetic foot problems? After completing all the possible actions within the Family Health Strategy to deal with the diabetic foot problem, do you have any support to continue your treatment?

After the end of each interview and before the next one, the researchers discussed the content of the interviews to carry out initial analyses (familiarization of the data) and suggestions for deepening the interview based on the experiences reported. Therefore, it was necessary to supplement the interview in some situations, as provided in the ICF. The interviews were audio-recorded and transcribed in full using *Microsoft Word®*. To ensure the confidentiality and anonymity of the participants, the reports were coded with the letter E for nurses and the sequential number of the interviews. Data collection ended when all eligible participants had been interviewed and data saturation¹⁵.

We opted for inductive thematic analysis to analyze the data, identifying, analyzing, interpreting, and relating the patterns (themes) incorporated into the data¹⁶. The analysis followed the following stages: familiarization of the data, generation of codes, search for themes, review of themes, definition and naming of themes, and final production of the analysis report¹⁶. The data was discussed with the literature on the subject.

The study respected the ethical precepts that guide research with human beings and data preservation. Authorization was obtained from the Municipal Health Department, and the Research Ethics Committee approved opinion no. 5.676.658. All the participants gave their consent by signing the Informed Consent Form.

RESULTS

Most of the study participants, 21 (87.5%), declared themselves female. Nine (37.5%) professionals have between 16 and 20 years' training, eight (33.3%) have worked in the municipality for more than 11 years, and 11 (45.8%) have worked in the FHS for no more than five years. In terms of postgraduate training, there is a predominance of *lato sensu* training, specialization, with five (20.8%) in the area of family health and three (12.5%) professionals with *stricto sensu* training, master's level. Four (16.6%) reported taking a specific DM course with a workload of between eight and 40 hours. For courses related to UILL in people with DM, only one (4.1%) participant reported having taken them.

Two thematic categories emerged from the analysis of the interviews: "Knowledge about lower limb ulcers or infections in people with diabetes *mellitus*" and "The work of nurses in caring for people with diabetes *mellitus*".

About the category "Knowledge about ulcers or infections in lower limbs in people with diabetes *mellitus*," the cause of UILL is identified as the complications of the disease, such as diabetic peripheral neuropathy (DPN).

[...] It's a common complication in patients with diabetes, right? Due to the impairment of diabetic neuropathy [...], they begin to show some clinical manifestations, such as paresthesia. (E02)

It's a sore that can happen with diabetes or a foot complication. Because he no longer has any sensitivity, right? (E11)

Participants also attribute the neglect of feet by people with DM to being a factor in the development of UILL. They point out that the progression of UILL can lead to amputation.

[...] It happens when the patient isn't careful, doesn't look after their feet, and hurts them, right? And where there is an injury or wound. Why? Because their circulation is poor and their blood glucose levels are high and poorly controlled [...]. (E1)

[...] it affects a large proportion of diabetics [...] a lesion that is difficult to heal because that person spends a long time wearing a bandage [...] we even have cases of amputation. (E20)

It points out that cases of UILL are a public health problem and that the situation has worsened during the pandemic.

It's a public health problem; after the pandemic, it got much worse [...] several patients were left with huge wounds that were difficult to heal, a terror [...], and he doesn't believe that a wound on his foot that doesn't heal and doesn't get better is going to cause him to lose his foot. A wound that affects all layers of the foot's structure. (E18)

Adesão dos pacientes, tanto nas consultas individuais quanto nos grupos. Acho que as pln the second category "Nurses' work in caring for people with diabetes mellitus", the difficulties in caring for people with DM were identified as not accepting the disease and weak engagement in self-care.

The patient's adherence to the guidelines and just following care, including dressings, diet, following the recommendations [...]. Changing takes work, changing a habit is very difficult, being healthy is very complicated, and we see long-term results, and nobody wants to wait; everyone wants immediate results. (E20)

Patient compliance, both in individual consultations and in groups. I think people are so busy that they don't have time to take care of themselves and they always say that a group is a waste of time. (E17)

The patient's decision. And so [...] the family doesn't cooperate much either, but because they think it won't do any good, that he's going to die like this [...] but the problem is the patient himself. (E5)

They say that the work of the nurse and the team focuses on renewing prescriptions and the Hiperdia Program. It was also found that the pandemic has hampered the progress of some activities in the units, especially educational groups.

Look renewing prescriptions every six months for diabetics is considered stable, and every three months for non-stable patients. Blood pressure and blood glucose checks every week. (E22)

We do Hiperdia, that's what I do [...] it's me and the technician, and we talk about it, if we need to, we pass it on to the doctor. (E05)

We have Hiperdia [...], the technician, who holds the group once a month to meet her PMAQ (Program for Improving Access and Quality) target. (E24)

[...] People do not well attend the meeting that the technician holds once a month; it's usually the same patients who come to have their blood glucose checked and stay at the meeting. (E15)

The pandemic got worse, and we used to carry out activities in groups, and then [...] the doctor and I would have consultations in between. The pandemic came, and the number of people in the unit had to be reduced [...], so everything was temporarily suspended. (E13)

In the context of nursing care, they report difficulties in carrying out preventive practices related to the high demand from the population, the reduced number of professionals to provide care, and the lack of time and planning:

I think the greatest difficulty in getting started is time [...] After the pandemic, the routine of the PSF (Family Health Program) changed a lot; many people migrated to the SUS (Unified Health System), and the demand increased a lot. With this increased demand, the number of professionals working has not increased. (E10)

Then, organizing the time and programming the time better, as we don't really have this practice of approach; from the moment we organize, structure, and make a script and put it into practice, it ends up becoming a routine. I think that's the biggest flaw. (E6)

Time [...] even to renew prescriptions is very complicated. We need more people to help us. There are too many people, too much work, and not enough people to do it. (E18)

It is not the nurse's practice to carry out foot assessments; they are only carried out at the request of the person with DM themselves or the coordination team's request. They say they don't have a protocol, but they do advise on foot care.

We don't do any evaluations [...] when the patient asks; we don't have time, it's a lot of work. Otherwise, they come and renew their prescription and leave. (E12)

Oh, we don't have a protocol, but we advise patients who come in; we're always giving advice about foot care, shoes, wearing the right shoes, that's all. (E1)

We do it, but not that often; we do it when there's usually a complaint, a complaint of an injury [...], but only in this sense, an active search to do that care, that examination from top to bottom, to examine the diabetic population, no. (E4)

Only when the coordinator asks me to or when something comes up. (E9)

Some participants describe how they carry out evaluations of UILL.

[...] For eyes, if the skin is moisturized and if it's intact, use footwear. The type of footwear is used to prevent it, right? Because it also reduces the sensation on the skin, right? Depending on the case, and if I see something related, like dehydration, I usually prescribe sunflower oil, which is if there's a fissure and we start to bandage it, as the doctor says [...]. (E11)

Related to the disease, comorbidities, sequel, hygiene, correct footwear, not walking barefoot, cutting nails, diet, and general prevention. (E18)

The evaluation is done by looking at the foot; I do some tests with an esthesiometer and look at the shoe. And I guide. I usually carry out these foot assessments as recommended once a year. Since there are so many diabetics, I schedule some of them for this assessment every Friday and ask the doctor at the health unit for help. The technician gives a talk once a month, and Hiperdia also every Friday. (E21)

As for continuing education actions, the professionals indicate the need for all staff to receive training on the UILL.

I think it's about time it happened because it's been a long time. I'm a nurse and haven't had any training on this, nor have the staff. So when we have a training session, we focus a little on that. If we don't have it, we forget about it. (E 09)

I have the habit of continuing education with the team every Thursday, but we just message them, and we don't have the habit of studying a topic. (E24)

Finally, they report that the municipality does not have a referral center for DM treatment, that specialized care takes a long time, and that there is a lack of human and material resources.

We have a specialized care center (NAE), a network of professionals, and others. We have nothing specific for diabetes or diabetic feet (...). (E21)

We have aromatherapy, but it's very bad for different materials, such as plates; hydrocolloid is not available, the patient has to buy it, and it's expensive, and he can't afford it. Specialized services, like consultations, take forever [...] here at the unit; we even buy some things, but if we have to buy everything, we can't afford it. (E08)

[...] For the time being, there is no diabetic foot reference for patients with diabetic feet. The patient decompensates and is sent to the nephrologist, who takes ages, then to the ophthalmologist, who also takes ages, and so on. (E09)

DISCUSSION

The knowledge that the participants in this study have about UILL in people with DM is mainly related to the complications of the disease, such as NPD, which can lead to amputation. The literature shows that IMDUs are the most debilitating complications and that the risk factors associated with their development and amputation are related to clinical aspects, such as NPD¹⁷⁻¹⁸.

In addition to the clinical condition, sociodemographic aspects, lifestyle, the person's knowledge, and self-care interfere in the development of UILL and amputation¹⁸⁻¹⁹. The nurses in this study identified people's neglect of their feet as a factor in the development of UILL. This perception of self-care is important, as it allows nurses to play a facilitating role in building knowledge and skills for self-care since one of the factors preventing this is the lack of knowledge among people with DM about essential foot care²⁰.

The participants pointed out UILL cases as a public health problem, which worsened during the pandemic. The context of social distancing and the reorganization of health services has not favored the care of people with DM, particularly UILL. Thus, the pandemic scenario may have contributed to the delay in seeking health services, increasing the number of people affected and worsening the clinical condition, including the risk of amputation with physical, psychosocial, and economic consequences²¹. The increase in the prevalence of lower limb amputations before and after the pandemic has been shown in the literature⁴⁻⁷.

In the work of nurses, one difficulty pointed out in providing nursing care to people with DM is the lack of acceptance of the disease and people's fragile engagement in self-care, a finding corroborated by the literature²²⁻²³. Timely self-care has been identified as a means of preventing the development of UILL, with satisfactory clinical results and promoting quality of life²³.

The work of the nurse and the team is restricted to renewing prescriptions and actions in the Hiperdia program and meeting targets related to the evaluation and financing system; in addition, the pandemic has hampered the provision of some activities in the

units, especially educational groups. The procedure of renewing/repeating prescriptions is a frequent practice carried out by nurses, centered on the biomedical model and complaint-conduct actions²⁴. In this sense, nurses miss opportunities to operate based on health needs²⁵. The invisibility and inappropriate use of the nursing consultation stand out, with the restriction of the focus of action of nurses, who take the renewal of prescriptions as their nursing practice instead of carrying out priority care actions for people with DM, and the consequent devaluation of the profession.

The actions of the Hiperdia program have been reduced, both by the lack of people's participation in the context of the pandemic and by the fact that care is restricted to measuring blood pressure and blood glucose and to the educational group. A study that sought to assess the nursing team's perception of the actions related to Hiperdia showed that the negative aspects were the overload of duties for nurses and the lack of support needed to fulfill the functions, which could lead to only the essentials being carried out, reducing the availability of resources and the involvement of the team and users with Hiperdia activities²⁶.

One of the main organizational axes of the FHS units is teamwork. Thus, to provide quality care, with a view to comprehensive health promotion and disease prevention actions, the entire team must participate in care actions collaboratively to build strategies and interventions to address the gaps identified in implementing the Hiperdia program²⁶.

In nurses' work, there are difficulties in carrying out preventive practices related to UILL and referral to specialized care. The literature also identifies these findings, such as a lack of professionals, high demand²⁴, lack of infrastructure, shortage of trained professionals, scarcity of materials, and a care model based on biological determinants and curativism²⁷.

It's clear that nurses don't routinely carry out UILL-related assessments and that the municipality has no protocol. A study on nursing consultations with people with DM in family health units in Portugal showed that 33.9% of consultations assessed behaviors such as adherence to self-control and foot surveillance²⁸. However, another study showed a low frequency of examination of the lower limbs and feet, developed in only 14.3% of consultations²⁹. These findings reinforce the need to examine the lower limbs and feet²⁸⁻²⁹ as part of the nursing consultation to provide comprehensive care.

When they are carried out, the risk assessment practices for the development of UILL are directed toward foot care guidelines (skin hydration, use of footwear, type of footwear, comorbidities, nail trimming, diet, and general prevention). These preventive actions align with the recommendations of the *International Working Group on the Diabetic Foot (IWGDF)*³⁰. A study aimed at understanding the care activities that makeup nursing care during consultations with people with DM found that 51.8% of nurses assessed the risk of ulcers or infections²⁸.

Concerning continuous education, the professionals point to the need for training on the subject for everyone on the team. It was also observed that few professionals had taken a course on DM, specifically about UILL. This reality of not investing in education at work about preventive care and the desire to do so is evidenced in the literature⁹⁻¹³.

A limitation of the study is that it was conducted in just one municipality, exploring the practice at a local level. This study is not intended to make generalizations. However, the findings' implications show prevention is the best way forward. To this end, health professionals, especially primary care nurses, should be encouraged to adopt preventive measures.

FINAL CONSIDERATIONS

The study's results confirm the assumption that knowledge and care practices related to lower limb ulcers or infections in people with DM are weakened in nursing actions. We therefore suggest investing in professional education to improve nursing practices and the quality of life of people with DM. Therefore, the research instigates important reflection on the challenges to be overcome by nursing in the context of comprehensive care for people with DM.

ACKNOWLEDGMENTS

This study was carried out with the support of the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brazil (CAPES) - Funding Code 001 and the project "Dialogues in the Training of Adults in Health in Brazil and France" funded by the CAPES/Cofecub Program (French Committee for the Evaluation of University Cooperation with Brazil) - Processes: Number: 88887.711939/2022-00 e 88881.711940/2022-01.

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***Article extracted from master's thesis:** "PRÁTICAS PREVENTIVAS REALIZADAS PELO ENFERMEIRO DA EQUIPE DE SAÚDE DA FAMÍLIA RELACIONADAS AS ÚLCERAS EM MEMBROS INFERIORES NO CUIDADO ÀS PESSOAS COM DIABETES MELLITUS", Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto, Ribeirão Preto, São Paulo, Brasil, 2023.

Received: 14/04/2023

Approved: 14/01/2024

Associate editor: Dra. Luciana Nogueira

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Role of Author:

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work -

Gonçalves PH, Cardoso AGF, Ribeiro T da S, Matumoto S, Fermino TZ, Fortuna CM, Viana AL. Drafting the work or revising it critically for important intellectual content - **Gonçalves PH, Cardoso AGF, Ribeiro T da S, Matumoto S, Fermino TZ, Fortuna CM, Viana AL.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Gonçalves PH, Cardoso AGF, Ribeiro T da S, Matumoto S, Fermino TZ, Fortuna CM, Viana AL.** Assistance with writing, technical editing, language editing and proofreading - **Gonçalves PH, Cardoso AGF, Ribeiro T da S, Viana AL.** All authors approved the final version of the text.

ISSN 2176-9133



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