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Medical Doctors, Nurses, and Therapeutic Health Practitioners Knowledge of Risk Factors and Prevention of Diabetic Foot Ulcer: A Cross-Sectional Survey in a South African Setting

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Abstract: Background/Objective: Prevention of foot ulceration is critical to reduce the amputation rate in individuals with diabetes mellitus (DM). We investigated the knowledge of diabetic foot care management and prevention of diabetic foot ulcer (DFU) among categories of healthcare practitioners (HCPs). **Methods**: This descriptive cross-sectional observational study was conducted at public healthcare facilities within the Charlotte Maxeke Johannesburg Academic Hospital Cluster in Gauteng, South Africa. Participants included podiatrists, physiotherapists, occupational therapists, dieticians, medical orthotists and prosthetists, nurses, and medical doctors. Data were collected using a self-administered questionnaire that assessed knowledge of DFU risk factors, foot examination, foot care, and appropriate footwear. Knowledge level was classified as extremely poor if less than 50% of participants from a category of HCPs answered appropriately, reasonable for 50–59%, average at 60–69%, above average from 70–79%, and excellent when ≥80%. The questionnaire was completed by 449 HCPs and analyzed using STATA version 15, with statistical significance set at a *p*-value less than 0.05. **Results**: A total of 449 HCPs participated, which comprised the following: 48.1% (216) therapeutic health practitioners (THPs), 37.4% (168) nurses, and 14.5% (65) medical doctors. Only 36% (162) of participants had prior education on DFU. The overall knowledge levels among participants were risk factors of DFU (80%), foot examination (80%), identification of limb-threatening conditions (82%), foot care (77%), and footwear (65%). Medical doctors had the highest median scores for risk factors (85) and foot examination (80), followed by nurses (80 for risk factors and 78 for foot examination). THPs had the lowest median scores for risk factors (78) and foot examinations (70). Differences in knowledge levels across HCPs were statistically significant ($p < 0.05$). **Conclusions**: THPs have insufficient knowledge of diabetic foot care and prevention of DFUs. Comprehensive training and targeted educational programs are needed to fill these gaps and improve patient care.

Keywords: diabetes mellitus; diabetic foot care management; healthcare practitioners; knowledge; diabetic foot ulcer; prevention; risk factors

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1. Introduction

Most non-traumatic lower amputations worldwide result from complications of diabetes mellitus (DM). Diabetic foot infection (DFI) is among the most common reasons for admission into hospitals for patients with DM and is usually preceded by diabetic foot ulcer (DFU) [1–6]. Diabetic foot ulcer (DFU) may be neuropathic, ischemic or mixed. Risk factors of DFU include male gender, age above 60 years, poor glycemic control, smoking, and longer duration of DM [7–9]. Other risk factors of DFU are peripheral neuropathy, peripheral artery disease (PAD), retinopathy, nephropathy, foot deformities, blistering of the skin, callosities, ingrown or thickened toenails, and fungal infections [7,9,10]. Early identification of a foot at risk and timely implementation of preventive or corrective measures lowers the chance of developing DFU and subsequently DFI [11–17]. In some cases, over 80% of patients admitted to a hospital with DFI end up with an amputation, and 30–50% are dead within 5 years following the amputation [17].

Management of patients with DM must be by a multi-disciplinary team, involving all categories of healthcare practitioners (HCPs). It is therefore important for all HCPs to have enough knowledge of factors of DFU and how to conduct a proper foot examination, identify a foot at risk, and practice good foot care, including selection and use of appropriate footwear [18,19]. It is recommended that every individual with DM must have at least one comprehensive foot examination yearly [18,19]. Healthcare practitioners are encouraged to implement the 10 key strategies in improving diabetic footwear practice to decrease the burden of DFU [20]. Diabetic foot care (DFC) is a key component of DM self-management, and therefore all HCPs who interact with patients with DM must educate them on how to take care of their feet to prevent DFU [21].

Appropriate footwear is one of the key strategies to prevent the development or recurrence of DFU, and patients with DM must wear shoes that are safe, fit well, and are comfortable. Inappropriate footwear may increase plantar pressures and mechanical stress [22–24]. Moreover, wearing appropriate footwear relieves plantar pressure during walking or standing and reduces the risk of development or recurrence of DFU [23,25–27]. This study investigated the level of knowledge among categories of HCPs regarding diabetic foot care management and prevention of DFU in individuals with DM.

2. Materials and Methods

2.1. Research Area

This was a descriptive cross-sectional observational study conducted at public healthcare facilities within the Charlotte Maxeke Johannesburg Academic Hospital Cluster (CMJAH). Charlotte Maxeke Johannesburg Academic Hospital is one of the central academic hospitals in the Gauteng Province of South Africa. The CMJAH Cluster is the largest cluster, comprising 14 hospitals with nine hospitals and three district health services involved in the care of patients with DM. The nine hospitals are East Rand Hospital, Helen Joseph Hospital, Rahima Moosa Hospital, Pholosong Hospital, Tambo Memorial Hospital, Bertha Gxowa Hospital, Dr. Yusuf Dadoo Hospital, Leratong Hospital, Edenvale Hospital, Carletonville Hospital, Sizwe Hospital, and South Rand Hospital. The three district health services are the Ekurhuleni Health District, West Rand Health District, and Johannesburg Health District.

2.2. Study Population

Participants included podiatrists, physiotherapists, occupational therapists, dieticians, medical orthotists and prosthetists, nurses, and medical doctors. Data from pharmacists were excluded during analysis because of a low response rate. Podiatrists, physiothera-

pists, occupational therapists, dieticians, medical orthotics, and prosthetics were grouped together as therapeutic health practitioners (THPs).

2.3. Research Participants

Convenient sampling was followed, and participants were invited using professional-specific forums, ward rounds, meetings, online communication systems, and at the polyclinics. Participants completed a self-administered questionnaire online or on a hard copy. Participation was voluntary. The questionnaire was derived from a similar study that looked at nurses' knowledge and attitudes towards the diabetic foot [28]. A pilot study was conducted with a sample of 15 participants to assess the questionnaire's validity and reliability. The results of this pilot test informed the refinement of the questionnaire, ensuring its clarity, relevance, and effectiveness in measuring the intended constructs.

2.4. Study Questionnaire

The questionnaire had three sections, with the first section covering the socio-demographic parameters and a professional category of the participant. The second section had questions on history and type of prior education, including format and training platform, and participant's training needs. The last section of the questionnaire assessed knowledge regarding diabetic foot care management and had five subthemes with a total of 67 questions. The 67 questions included 10 about DFU risk factors, 16 on proper foot exams, 27 on foot care, 9 on choosing and using footwear correctly, and 5 on identifying serious limb conditions. Participants were asked to choose 'yes' or 'no' for each question. The questions covered various topics, including both correct and incorrect information. Participants were expected to choose 'yes' if the information was correct and 'no' if it was incorrect. Questionnaires were completed electronically via a survey link sent to the participants by email or on hard copies distributed to participating hospitals and all clinics within the three districts. Participants completed the survey anonymously after signing an informed consent. The estimated time for participants to complete the survey was 20 min. Hard copies of completed questionnaires were collected from the participants by the researchers assisted by the delegated HCPs in each of the participating facilities.

2.5. Data Analysis

We captured and entered the data onto an MS Excel spreadsheet and thereafter used STATA version 15 for analysis. After capturing the data, the total scores for an individual participant for the themes in Section 3 were recorded and converted into a metric ranging from 0 to 100. The scores were categorized as extremely poor if less than 50, reasonable if 50–59, average from 60–69, above average if 70–79, and excellent when above 79. The level of knowledge was insufficient if the individual, group, or overall score in a theme was less than 80. We captured the data to provide a view on knowledge of each participant and professional group regarding appropriate foot care independently to avoid bias. Analyzing the three groups of HPCs independently to avoid biases was important in our study, especially considering the assumption that education levels differ significantly among HCPs. Among the assumptions in the survey was that all HCPs involved in the day-to-day prevention and management of DFU would be more knowledgeable of prevention and care of diabetic foot regardless of their education level and their scope of practice.

Findings were presented in a way that facilitated comparison of individual scores and scores across professional groups and provided a holistic view of combined scores of participating professions. We used a box and whisker plot to depict the range of scores for each category of healthcare professions, highlighting variability and a median score for a visual summary of the data. We used the chi-square test to assess the significance of differences between groups. Statistical significance was set at a p-value less than 0.05. Ethical clearance

to conduct the study was received from the Human Research Ethics Committee (Medical) of the University of the Witwatersrand (M190563) and followed the guidelines contained in the 2024 revised Declaration of Helsinki of the World Medical Association.

3. Results

Four hundred and forty-nine completed questionnaires were returned, and 48.1% (216/449) of participants were THPs, 37.4% (168/449) were nurses, and 14.5% (65/449) were medical doctors. The majority (320/449) of participants were female (Table 1).

Table 1. Socio-demographic characteristics of participants (N = 449).

Variables	Number
Profession	
Medical doctors	65 (14.5%)
Nurses	168 (37.4%)
Therapeutic health practitioners	216 (48.1%)
Sex	
Male	120 (26.7%)
Female	320 (71.3%)
Not specified	9 (2%)
Service unit	
Polyclinic	70 (15.6%)
Rehabilitation unit	150 (33.4%)
Therapeutic unit	56 (12.5%)
Medical-related unit	90 (20%)
Surgical-related unit	32 (7.1%)
Not specified	51 (11.4%)

Prior Training and Provisioning of Health Education to Patients

Two hundred and eighty-seven (63.9%: 287/449) participants had no training on foot care or risk factors of DFU. Sixty-eight (41%: 68/168) of the nurses and 40% (26/65) of the medical doctors had had specific training on foot care and prevention of DFU compared to 29% (63/216) of THPs, and the difference was statistically significant (p = 0.032). Two hundred and twenty (49%: 220/449) participants had had general education on DM and diabetic foot during their undergraduate training. Overall, 65% (284/449) of the participants educated their patients with DM on foot care during consultation. Fifty-two (80%: 52/65) medical doctors educated their patients on foot care compared to 66.5% (107/161) and 59.2% (125/211) of nurses and THPs, respectively; and the difference across the three professional groups was statistically significant (p = 0.008) (Table 2).

The box and whisker analysis of diabetic foot care management knowledge among HCPs showed significant differences. Doctors had the highest and most consistent knowledge across all categories, with median scores of 85 for risk factors and 80 for foot examination. Nurses had high knowledge levels but more variability, with median scores of 80 for risk factors and 78 for foot examination. THPs had the lowest median scores and the most variability, indicating significant knowledge gaps (Figure 1).

One hundred and sixty-eight (78%: 168/216) of THPs were aware that poor glycemic control was a risk factor for the development of DFU, which was statistically significantly lower than 82% (137/168) of nurses and 95% (62/65) of medical doctors (p = 0.002). Similarly, differences in the level of knowledge among the HCPs that PAD, callosities, and foot deformities are risk factors of DFU were statistically significant with p-values of 0.038, 0.029, and 0.044, respectively (Figure 2).

Table 2. Healthcare professional prior education and platform and nature of training on diabetic foot care management, and involvement in patients' education (*N* = 449).

Variable	Total	Medical Doctors	Nurses	Therapeutic Health Practitioners	*p*-Value
Prior training in diabetic foot care					
No	284 (63.3%)	37 (57%)	96 (59%)	151 (71%)	0.032
Yes	157 (35%)	26 (40%)	68 (41%)	63 (29%)	
Not specified	8 (1.8%)	2 (0.4%)	8 (4.8%)	2 (0.9%)	
Training platform and nature					
Undergraduate	78 (17.3%)	30 (46.2%)	24 (114.3%)	24 (11.1%)	
Short course	36 (5.8%)	5 (7.7%)	18 (10.7%)	13 (6%)	
Workshops, in-service training, seminars, symposium or CPD activities	17 (3.8%)	0 (0%)	4 (2.4%)	11 (5.1%)	
On-site training or self-training	19 (4.2%)	0 (0%)	9 (5.4%)	10 (4.6%)	
Education of patients on foot care					
No	153 (35%)	13 (20%)	54 (34%)	86 (41%)	0.008
Yes	284 (65%)	52 (80%)	107 (66%)	125 (59%)	

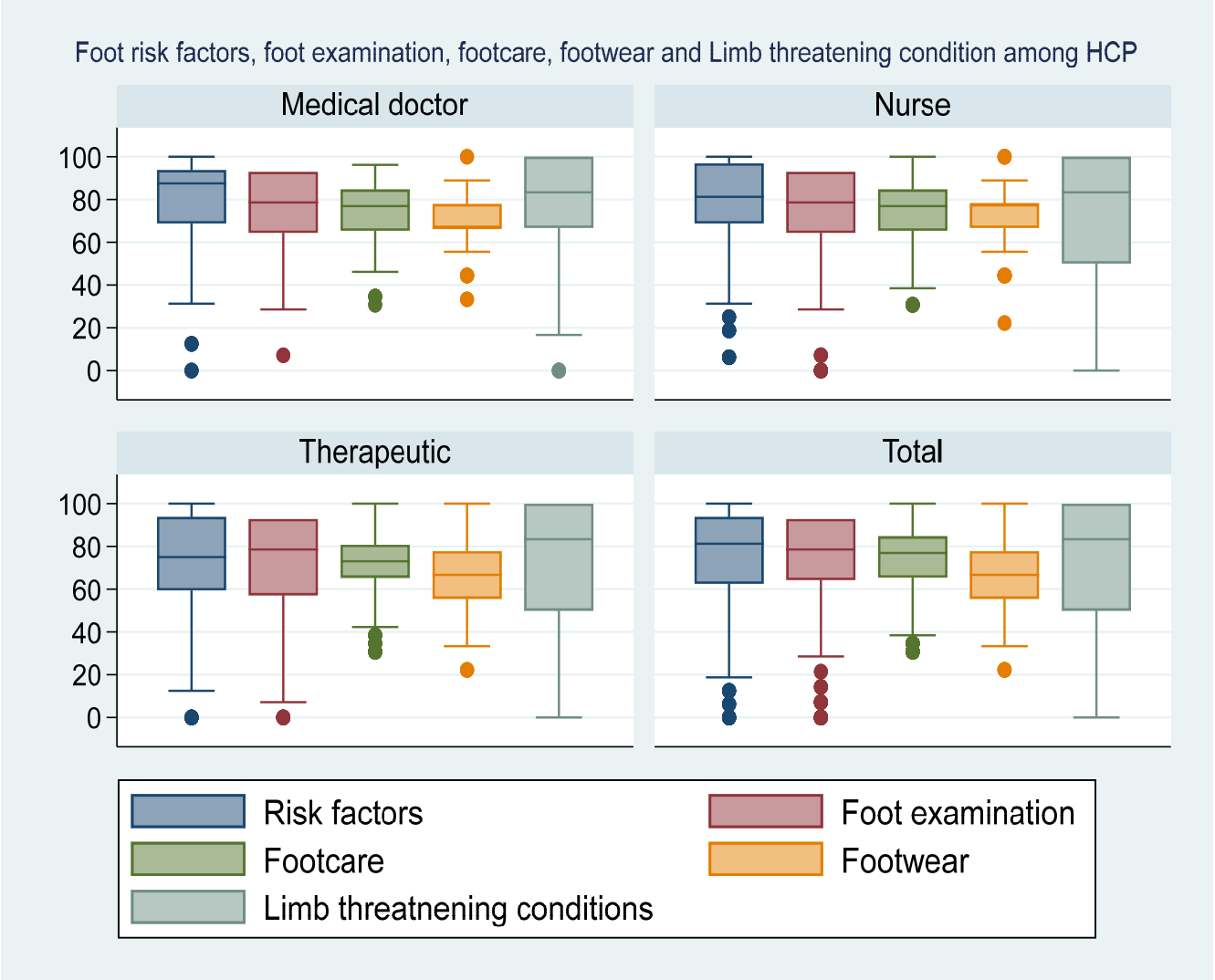


Figure 1. Box-and-whiskers plot comparing knowledge levels among medical doctors, nurses and THPs regarding risk factors, proper foot examination, foot care, selection and appropriate use of footwear and identification of limb-threatening conditions.

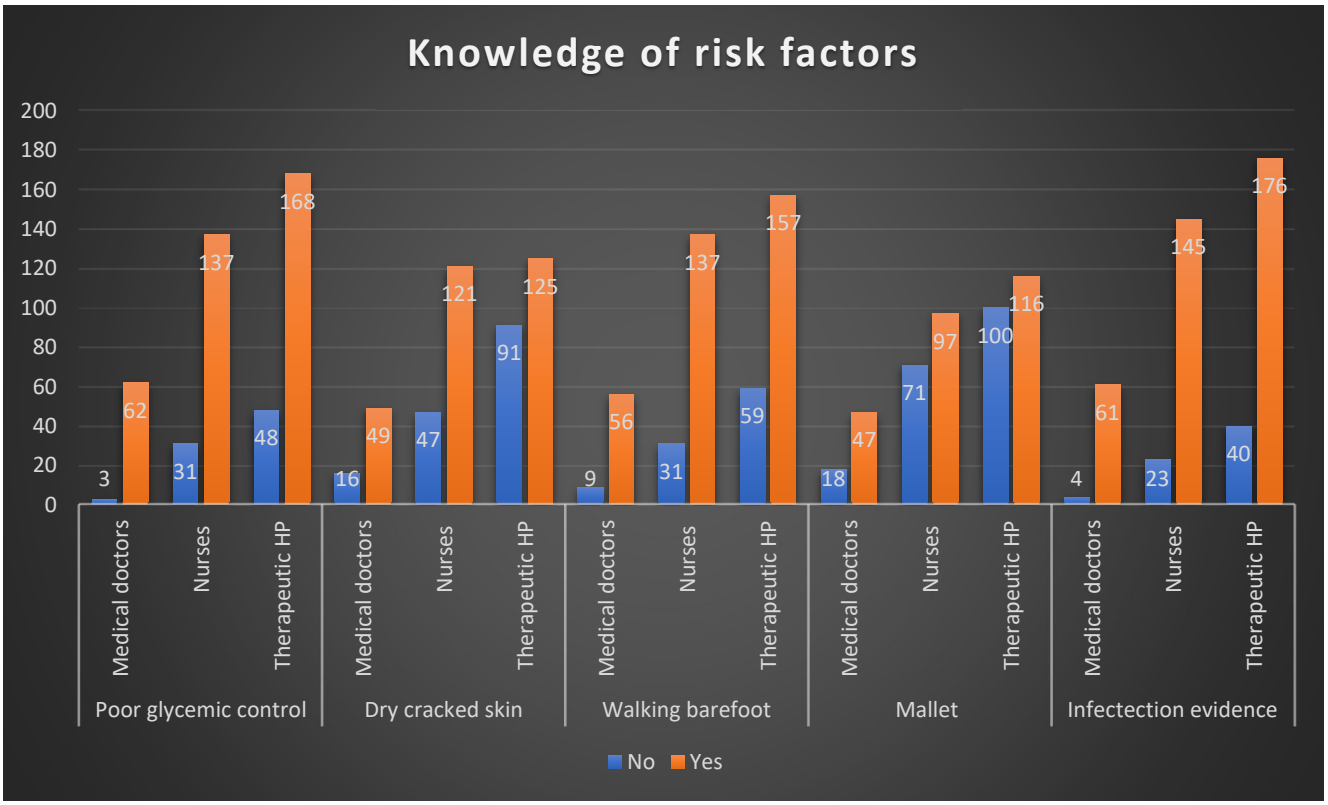


Figure 2. Comparison of levels of knowledge of risk factors among the categories of HCPs (N = 449). No = disagree; Yes = Agree.

Three hundred and seventy-four (83%: 374/449) participants agreed that smoking is a risk factor of DFU, which included 59% (126/216) of THPs and 76% (128/168). The difference in the level of knowledge regarding smoking and DFU was statistically significant (p = 0.001). Fifty-three (82%: 53/65) of medical doctors agreed that gait should be assessed during foot examination compared to 60% (100/168) of nurses, and the difference was statistically significant (p = 0.006). Furthermore, 91% (59/65) of medical doctors and 48% (81/168) of nurses agreed that assessment of proprioception should be included during foot examination, and the difference was statistically significant (p < 0.0001) (Figure 3).

Fifty-two (80%: 52/65) medical doctors indicated that the spaces between the toes must be kept moist compared to nurses 64% (107/168), and the difference was statistically significant (p = 0.044). Of nurses and THPs, 83% of each agreed with doing daily exercises by patients to improve the circulation compared to 64% (44/65) of medical doctors, and the difference was also statistically significant (p = 0.017). The difference in level of knowledge among nurses regarding washing of the feet with warm water was 83% (139/168) and 64% (43/65) for doctors, which was statistically significant (p = 0.016). Of the THPs, 80% (172/216) supported checking the temperature of the water before washing the feet compared to 92% (154/168) of nurses, and the difference was statistically significant (p = 0.002).

Among the THPs, 65% (140/216) agreed on preventing foot corn and callus formation compared to 80% (52/65) of medical doctors. From nurse participants, 64% (106/168) agreed that socks should be worn for warmth, while only 39% (84/216) of THPs agreed. The difference in the level of knowledge regarding the daily changing of socks, not wearing torn, wrinkled, or oversized socks, and that socks should be checked for wetness and color change and that socks must be changed every day was statistically significant (p = 0.007). The difference in level of knowledge regarding avoiding walking barefoot, prolonged standing, and crossing the legs while sitting was statistically significant (Figure 4).

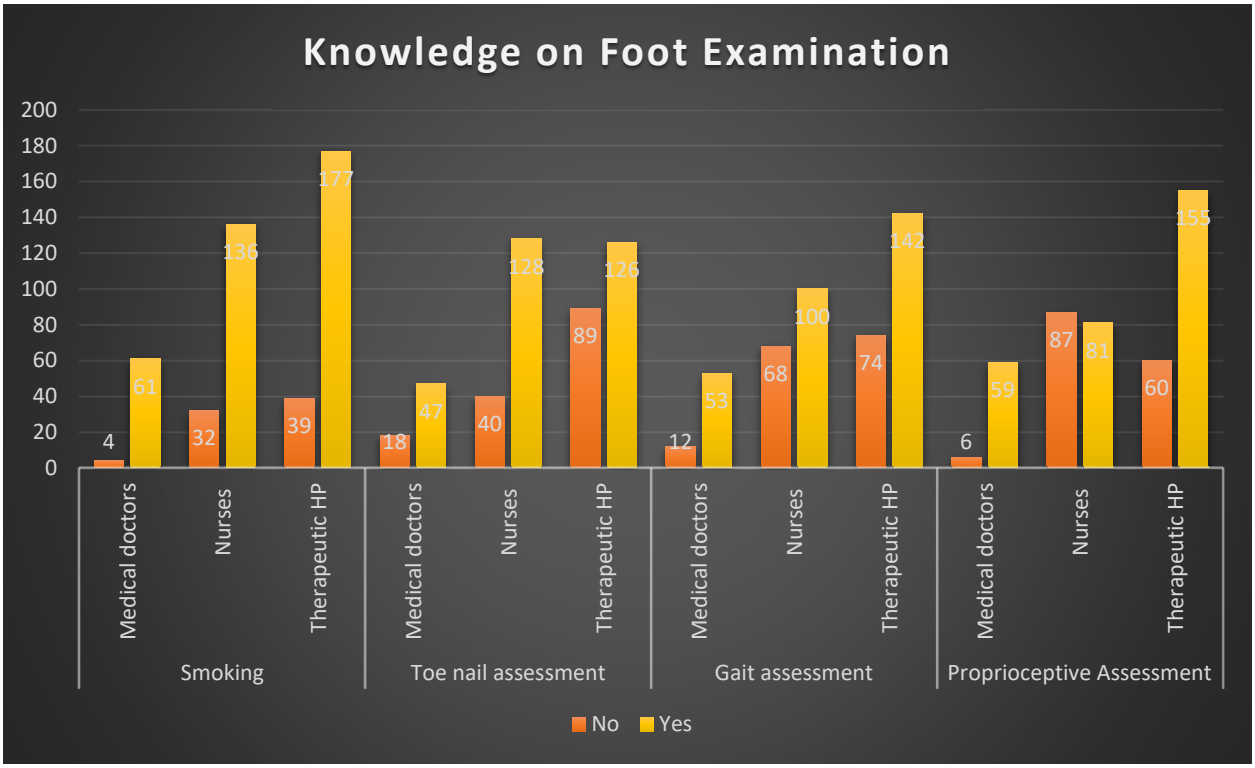


Figure 3. Comparison of level of knowledge of risk factors of DFU and elements of proper foot examination (N = 449). No = Disagree; Yes = Agree.

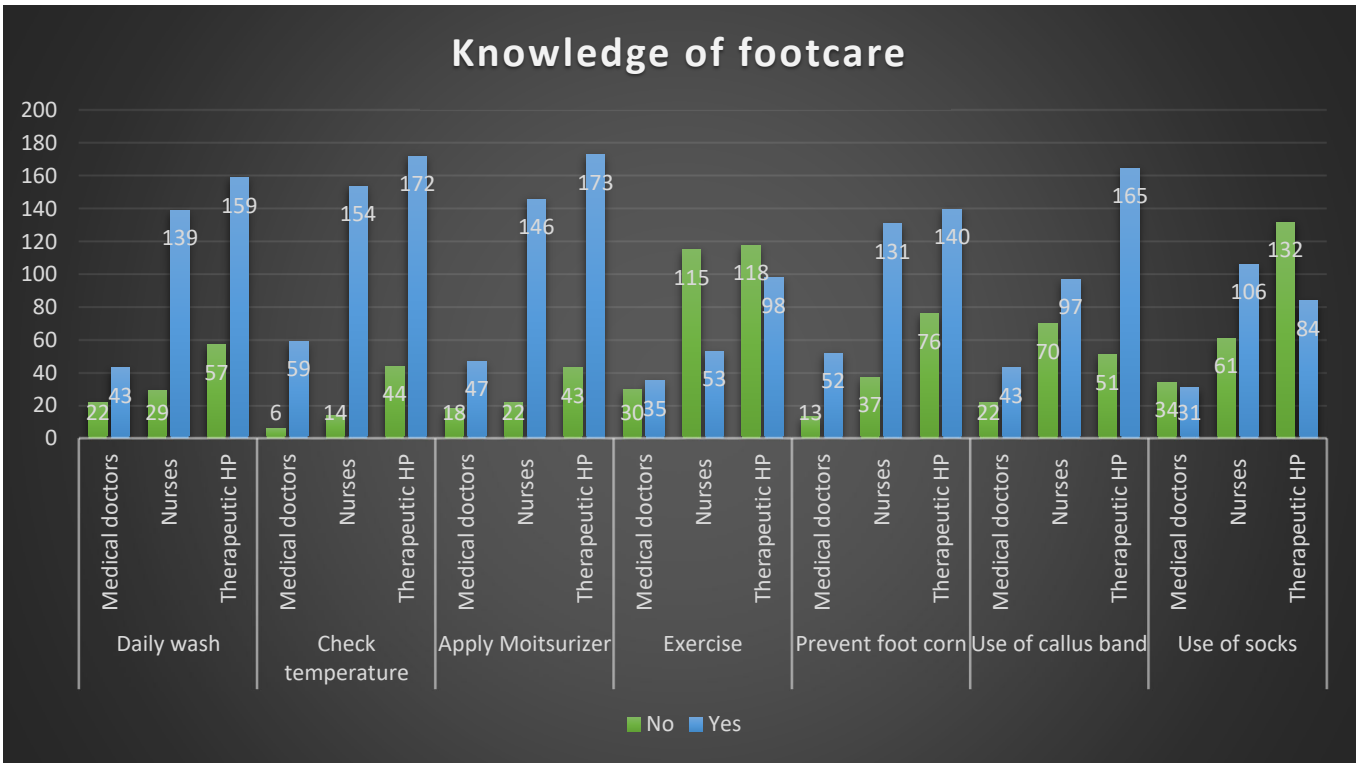


Figure 4. Comparison of level of knowledge among categories of HCPs regarding foot care (N = 449). No = Disagree; Yes = Agree.

Among medical doctors, 51% agreed that shoes fitting and grasping feet should be worn, and 22% that doctors should be consulted for foot deformities, and 17% to the preference of soft-skinned and comfortable shoes. More nurses (12%: 20/168) compared

to the other groups disagreed with the use of high-heeled shoes, but the difference was not statistically significant ($p = 0.117$). Other responses, which did not yield statistically significant differences included allowing the feet to adjust to new shoes ($p = 0.357$) and the importance of checking shoes for foreign bodies before wearing them ($p = 0.334$) (Table 3).

Table 3. Comparison of level of knowledge among categories of HCPs regarding selection and use of footwear ($N = 449$).

Footwear Variables	Total	Medical Doctors	Nurses	Therapeutic Health Practitioners	*p*-Value
Shoes should fit and grasp feet Disagree Agree	 215 (48%) 234 (52%)	 33 (51%) 32 (49%)	 82 (49%) 86 (51%)	 100 (46%) 116 (54%)	0.782
High-heeled shoes should be preferred Disagree Agree	 38 (8%) 411 (92%)	 5 (8%) 60 (92%)	 20 (12%) 148 (88%)	 13 (6%) 203 (94%)	0.117
New shoes should be worn and allow feet to adjust to them Disagree Agree	 194 (43%) 255 (57%)	 29 (45%) 36 (55%)	 79 (47%) 89 (53%)	 86 (40%) 130 (60%)	0.357
Shoes should be painted frequently Disagree Agree	 62 (14%) 387 (86%)	 8 (12%) 57 (88%)	 23 (14%) 145 (86%)	 31 (14%) 185 (86%)	0.915
If there is a deformity in the foot, a doctor should be consulted for proper treatment or orthopaedic shoes Disagree Agree	 89 (20%) 360 (80%)	 14 (22%) 51 (78%)	 27 (16%) 141 (84%)	 48 (22%) 168 (78%)	0.303
A shoe should not lose its exterior protection feature Disagree Agree	 142 (32%) 307 (68%)	 21 (32%) 44 (68%)	 55 (33%) 113 (67%)	 66 (31%) 150 (69%)	0.894
Shoes should be worn without socks and, if shoe insoles are worn out, they should be replaced Disagree Agree	 365 (81%) 84 (19%)	 55 (85%) 10 (15%)	 127 (76%) 41 (24%)	 183 (85%) 22 (15%)	0.057
Soft-skinned and comfortable shoes should be preferred Disagree Agree	 71 (16%) 378 (86%)	 11 (17%) 54 (83%)	 27 (16%) 141 (86%)	 33 (15%) 183 (85%)	0.944
Shoes should be checked for foreign bodies such as nail, gravel, etc. before each wear Disagree Agree	 59 (13%) 389 (87%)	 5 (8%) 60 (92%)	 25 (15%) 142 (85%)	 29 (13%) 187 (87%)	0.334

Fifty-seven (88%: 57/65) medical doctors, 65% (110/168) nurses, and 54% (116/216) agreed that osteomyelitis should be worrisome of potentially limb-threatening DFI, and the difference was statistically significant ($p < 0.001$). The difference in knowledge level regarding the risk of rapidly spreading infection in DFS among categories of HCPs was not statistically significant (p-value = 0.992) (Table 4).

Table 4. Comparison of level of knowledge among HCPs regarding the signs of limb-threatening conditions ($N = 449$).

Variables for Limb Threatening Conditions	Total	Medical Doctor	Nurses	Therapeutic Health Practitioners	*p*-Value
Chronic limb ischemia Disagree Agree	 93 (21%) 357 (79%)	 9 (14%) 56 (86%)	 37 (22%) 131 (78%)	 47 (22%) 169 (78%)	0.335
Osteomyelitis Disagree Agree	 166 (37%) 283 (63%)	 8 (12%) 57 (88%)	 58 (35%) 110 (65%)	 100 (46%) 116 (54%)	<0.0001
Extensive soft tissue loss Disagree Agree	 107 (24%) 342 (76%)	 7 (11%) 58 (89%)	 41 (24%) 127 (76%)	 59 (27%) 157 (73%)	0.023
Rapid progression of infection Disagree Agree	 156 (35%) 293 (65%)	 23 (35%) 42 (65%)	 58 (35%) 110 (65%)	 75 (35%) 141 (65%)	0.992
Extensive bony destruction of the foot Disagree Agree	 128 (29%) 321 (71%)	 15 (23%) 50 (77%)	 49 (29%) 119 (71%)	 64 (30%) 152 (70%)	0.574

4. Discussion

The study examined the levels of knowledge among medical doctors, nurses, and THPs in a South African setting regarding appropriate foot examination and foot care needed for prevention of DFU. We found significant differences in the level of knowledge of some of the measures that are important in the prevention of the development and recurrence of DFU across categories of HCPs. Medical doctors and nurses scored highest on questions on risk factors of DFU and how to conduct appropriate foot examinations compared to the THPs' group. Overall, while most HCPs possess high levels of knowledge in most aspects of diabetic foot care, significant gaps of knowledge in foot care and selection were found.

4.1. Healthcare Practitioners' Knowledge of Risk Factors

This study found that nurses and medical doctors are more knowledgeable of risk factors of DFU, including poor glycemic control, compared to THPs. Insufficient knowledge of the significance of good glycemic control among THPs may hinder their ability to participate in the monitoring of the level of blood glucose levels, screen for symptoms of hyper- or hypoglycemia, and refer patients for timely treatment. The gap in knowledge regarding the importance of good glycemic control in the prevention of DFU among the THPs may be due to limited teaching and training exposure. Patients who access THP services may also lack awareness of the warning signs of poor glycemic control, exacerbating the issue and consequently increasing healthcare costs, the risk of amputation, reduced quality of life, and increased mortality [29]. Regular monitoring of blood glucose to prevent uncontrolled hyperglycemia and to improve patient outcomes [30].

4.2. Knowledge of Proper Foot Examination Among Healthcare Professions

We identified significant gaps in the levels of knowledge among THPs and nurses in how to conduct a proper foot examination, including assessment of toenails, gait, and proprioception. Although it was expected that the THPs would excel in gait and proprioception as a group, their scores were the lowest across virtually all the domains, which might have been due to limited teaching and training exposure during undergraduate education, as was found in the study. Insufficient assessment and care of toenails may predispose individuals with DM to DFU and subsequently the development of DFI [10,31]. Early identification of gait changes and timely implementation of corrective treatment are crucial in the prevention of DFU and its complications [32]. To facilitate early interventions and prevent falls, THPs and nurses need to enhance their knowledge and practical expertise to perform proper neurological assessment of a foot, including proprioception [18].

4.3. Knowledge Levels on Foot Care Among Professional Groups

All HCPs must possess sufficient knowledge of foot care to effectively manage diabetic foot and its complications. Nurses demonstrated the highest levels of knowledge of foot care in the study, compared to doctors and THPs. Despite the above, none of the groups achieved the threshold for "excellent knowledge." While nurses showed commendable expertise in specific areas like washing and moisturizing of the feet, medical doctors and THPs excelled in knowledge regarding appropriate exercises, such as twisting and stretching of the foot and toes. Factors that might have contributed to insufficient knowledge of foot care among the HCPs in our study included absent or minimal teaching and training during undergraduate education, limited involvement of some of the HCPs in diabetic foot care, insufficient involvement in continuing professional development and upskilling course and lack of emphasis on the importance of diabetic foot care to practitioners working at primary care level facilities [33].

Ranuve et al. (2022) and Wui et al. (2020) also found insufficient levels of knowledge on foot care among HCPs in two studies conducted in Fiji and Malaysia, respectively [34,35]. However, some studies reported a mismatch between theoretical knowledge and practical skills, with the majority of HCPs studied knowing what should be performed but not putting it into practice [36–39]. Similarly, the majority of HCPs in our study did not educate their patients on the importance of foot care and early recognition of complications and timely consultation despite being knowledgeable of the importance of patients' education. South African guidelines on the management of type 2 DM recommend comprehensive foot care education and training of HCPs to prevent DFU and its complications, improve patient outcomes, and promote inter-professional collaboration [40].

4.4. Knowledge of Appropriate Selection and Use of Footwear

Inappropriate footwear significantly increases the risk of DFU by elevating plantar pressure and mechanical stress [22–25]. Our study found that HCPs lack sufficient knowledge of footwear that is appropriate for use by individuals with DM. Our results are like those of Alsaigh et al. (2022) and Noureen et al. (2023), who reported significant gaps in knowledge of appropriate footwear among HCPs [36,37]. Incorrect selection and use increase the risk of the development of blisters and/or, calluses that may progress to DFU and diabetic foot infections (DFI), which may lead to major lower extremity amputation [23–26].

4.5. Knowledge of Limb-Threatening Conditions Among Healthcare Professionals

Diabetic foot infection increases the risk of amputation if treatment is delayed [2,4,17]. Severe DFIs include infections that extend to deeper tissues, including bone [40]. Patients with DFI associated with osteomyelitis have severe infections that must be treated expeditiously, as they are at increased risk of major amputation and death [41,42]. Our study found that all categories of HCPs had sufficient levels of knowledge of limb-threatening conditions. Medical doctors exhibited greater levels of knowledge of osteomyelitis as a marker of severe DFI and a major risk factor of foot amputation compared to nurses and THPs. The difference in the levels of knowledge across HCPs may be due to limited teaching and training in DFI in some of the healthcare professions and over-reliance on specialists, which may delay the institution of appropriate treatment of osteomyelitis and prolonged pain and disability and reduce the quality of life [43].

4.6. The Strength of the Study

This pioneering study provides the first comprehensive comparison of knowledge regarding diabetic foot care management among various categories of healthcare professionals (HCPs), including medical doctors, nurses, and THPs. This research offers valuable insights into the strengths and weaknesses of each professional group, underscoring the importance of multidisciplinary collaboration in the prevention and management of DFU and its complications. By engaging HCPs at primary, regional, tertiary, and academic institutions, this study ensured a broad and representative sample, enhancing the generalizability of its findings. The research identified gaps in knowledge in specific areas of prevention and treatment of DFU among the HCPs, which can guide the development of targeted educational interventions and training programs to improve diabetic foot care. The findings have significant practical implications for enhancing diabetic foot care through education and training for better patient outcomes. The study lays a foundation for future studies evaluating the effectiveness of educational programs and training methods in improving knowledge of HCPs and practices related to diabetic foot care.

4.7. Study Limitations

One of the limitations of this study is that only 500 questionnaires were distributed and targeted HCPs who actively participated in meetings and workshops. Furthermore, data collection for this study was conducted during the COVID-19 pandemic, which may have limited the availability and participation of some healthcare professionals due to pandemic-related circumstances. Additionally, the study's questionnaire was intentionally kept basic, focusing on fundamental issues, as in-depth knowledge of diabetic foot care varies widely among healthcare professionals. While this study provides valuable insights into healthcare professionals' knowledge, it is essential to note that good knowledge does not always translate to best practice. Future studies should investigate healthcare professionals' practices when treating patients with diabetic foot ulcers. Furthermore, this study's findings are specific to the CMJAH cluster and cannot be generalized to all healthcare professionals in South Africa. The study's sample could have been further strengthened by disaggregating medical doctors, nurses, and therapeutic health practitioners according to their fields and specialties. Future research should explore their level of knowledge in diabetic foot care. To provide a more comprehensive understanding, a similar study should be conducted at a national level, incorporating community healthcare workers, who play a vital role in the healthcare system.

5. Conclusions

Our study reveals significant variations in the levels of knowledge among HCPs in public healthcare facilities in Gauteng Province of South Africa regarding risk factors of DFU, identification of a foot-at-risk, and appropriate foot care. While medical doctors and nurses showed high levels of knowledge of risk factors of DFU and how to conduct a comprehensive foot examination, THPs exhibited notable knowledge gaps, particularly in risk factors including the importance of good glycemic control and what to look for during foot examination. Insufficient knowledge of risk factors of DFU and how to assess the feet of individuals with DM may increase the risk of complications. Effective DFU management requires comprehensive training and education for all HCPs involved in diabetic foot care. Less than 35% of HCPs working in public healthcare facilities in Gauteng Province were educated or trained on diabetic foot management. We recommend targeted educational interventions and inclusion of diabetic foot care management modules in the curricula of all healthcare professions. Future research should focus on evaluating educational programs and investigating barriers to training and ensuring sustained improvements in DFU prevention and management.

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Abbreviations

The following abbreviations are used in this manuscript:

DFI	Diabetic foot infection
DFU	Diabetic foot ulcer
DM	Diabetes mellitus
HCPs	Healthcare practitioners
THPs	Therapeutic health practitioners

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