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KNOWLEDGE OF DIABETIC FOOT ULCER MANAGEMENT AMONG NURSES: EVIDENCE FROM LAHORE GENERAL HOSPITAL, LAHORE, PAKISTAN

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ABSTRACT

Background: *Diabetic Foot Ulcers (DFUs) are a common and severe complication of diabetes. Nurses play a pivotal role in DFU management; however, their knowledge often remains inadequate. Assessing their knowledge is essential to identify gaps and improve quality of care.*
Materials and Methods: A cross-sectional study was conducted at Gangaram Hospital and Mayo Hospital, Lahore, from August 2024 to November 2024. A structured questionnaire on DFU management was administered to 240 nurses. Knowledge levels were categorized into Level 1 (>50% correct answers) and Level 2 (≤50%).
Results: *Among 240 nurses surveyed, only 31.3% had received formal wound care training, and more than half (56.3%) had less than five years of wound care experience. Nurses who had undergone training achieved significantly higher knowledge scores ($p \leq 0.001$) compared to untrained nurses, while workplace and experience showed no significant association with knowledge level.*
Conclusion: *Structured training programs are essential to enhance nurses' knowledge and competency in diabetic foot ulcer management.*
Keywords: *Nurse, Knowledge, Diabetic Foot Ulcer, Management*

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder that has reached alarming levels globally, posing significant challenges to healthcare systems. Recent evidence indicates that the prevalence of diabetes continues to rise, bringing with it serious complications such as cardiovascular disease, renal impairment, neuropathy, and diabetic foot ulcers (DFUs), which constitute one of the most debilitating outcomes (Brown, Chan, & Davies, 2023). Countries across Asia, including Vietnam, have reported high and increasing rates of diabetes, highlighting the burden on healthcare resources and the urgent need for effective preventive and management strategies (Ngoc, Lin, & Ahmed, 2020; Pham & Eggleston, 2016; Miyakawa et al., 2017). These trends reinforce the importance of equipping frontline healthcare professionals, particularly nurses, with adequate knowledge to manage diabetes and prevent its complications.

Within the clinical context, diabetic foot ulcers represent a leading cause of morbidity, disability, and hospitalization among people with diabetes. Studies across different countries have shown that

nurses' knowledge about DFU prevention and care is often inadequate, which can directly compromise patient outcomes (Alkhatieb et al., 2022; Abate et al., 2020; Dung, Trang, & Tung, 2020). Research further indicates that structured educational programs significantly enhance nurses' competence, improving both their knowledge and practice regarding DFU care (Ramzan, Sarwar, Afzal, & Khan, 2022). Given their central role in patient care and early detection of complications, nurses' preparedness is crucial to reducing amputation rates and improving the quality of life among diabetic patients.

In Pakistan, diabetes has reached epidemic proportions, with an estimated prevalence of around 33 million adults living with the condition—making it one of the top ten countries globally in terms of disease burden. The prevalence of DFUs is particularly concerning, as poor awareness, limited resources, and inconsistent training contribute to delayed management and higher amputation rates. Evidence from Lahore and other tertiary care hospitals underscores a significant gap in nurses' knowledge of diabetic foot care, despite their frontline responsibilities (Ramzan et al., 2022). Therefore, assessing and addressing these knowledge gaps at institutions such as Lahore General Hospital is vital for strengthening the healthcare response to diabetes, reducing complications, and ultimately alleviating the national burden of disease.

1. Materials and Methods

1.1 Study Design and Setting

A cross-sectional study was conducted at two major tertiary care hospitals in Lahore, namely Gangaram Hospital and Mayo Hospital, from August 2024 to November 2024. These hospitals were selected because of their high patient load and specialized departments managing diabetes and its complications, including diabetic foot ulcers (DFUs).

1.2 Study Population and Sampling

The study targeted registered nurses working in departments directly involved in the management of diabetic patients, such as Endocrinology, Orthopedics, Cardiology, and Neurology. A purposive sampling method was employed to recruit participants with relevant clinical exposure. In total, 240 nurses were enrolled, and all provided written informed consent before participation. Nurses with less than six months of clinical experience or those engaged solely in administrative or managerial duties were excluded.

1.3 Data Collection Tool

Data were collected using a structured questionnaire developed on the basis of American Diabetes Association (ADA) guidelines. The questionnaire comprised two parts: (i) socio-demographic and professional characteristics of the nurses, and (ii) seven knowledge-based items covering DFU risk factors, clinical features, diagnostic procedures, and preventive measures. Each question contained multiple correct response options to capture partial knowledge levels.

1.4 Data Collection Procedure

Trained health professionals administered the questionnaires during working hours. Each participant was given 15 minutes to complete the survey independently. Confidentiality was maintained throughout, and participation was voluntary. All 240 nurses completed the questionnaire and returned it for analysis.

1.5 Knowledge Assessment and Statistical Analysis

Knowledge levels were classified into two categories: Level 1 for participants who answered more than 50% of items correctly, and Level 2 for those who answered 50% or fewer. Data were coded and analyzed using Stata version 11.0. Descriptive statistics were computed for demographic characteristics, and Chi-square and t-tests were applied to compare knowledge scores across subgroups. A p-value ≤ 0.05 was considered statistically significant.

2. Results

Table 1. Socio-demographic and work-related characteristics of nurses at Gangaram and Mayo Hospitals, Lahore (n = 240)

Characteristics	Sub-groups	Gangaram Hospital (n=120)	Mayo Hospital (n=120)	Total (n=240)
Age (years)	Mean ± SD	34.5 ± 6.8	33.9 ± 7.1	34.2 ± 7.0
	Min–Max	24–49	23–50	23–50
Wound care experience	< 5 years	65 (54.2%)	70 (58.3%)	135 (56.3%)
	≥ 5 years	55 (45.8%)	50 (41.7%)	105 (43.7%)
Wound care training	Yes	40 (33.3%)	35 (29.2%)	75 (31.3%)
	No	80 (66.7%)	85 (70.8%)	165 (68.7%)
Hospital Unit	Trauma-Orthopedics Dept	32 (26.7%)	40 (33.3%)	72 (30.0%)
	Cardiology Dept	24 (20.0%)	22 (18.3%)	46 (19.2%)
	Endocrinology Dept	46 (38.3%)	48 (40.0%)	94 (39.2%)
	Neurology Dept	18 (15.0%)	10 (8.3%)	28 (11.6%)

Table 1 presents the socio-demographic and work-related characteristics of 240 nurses surveyed at Gangaram and Mayo Hospitals, Lahore. The mean age of participants was 34.2 ± 7.0 years (range: 23–50 years). More than half of the nurses (56.3%) had less than five years of wound care experience, while 43.7% reported five years or more. Only 31.3% had received formal wound care training after graduation. The majority of respondents were working in the Endocrinology Department (39.2%), followed by Trauma-Orthopedics (30.0%), Cardiology (19.2%), and Neurology (11.6%).

Table 2. Nurses' knowledge levels according to number of correct answers (n = 240)

Number of Questions	Level 1 (>50% Correct)		Level 2 (≤50% Correct)	
	N	%	N	%
1	68	28.3	52	21.7
2	55	22.9	45	18.8
3	42	17.5	38	15.8
4	28	11.7	32	13.3
5	15	6.3	25	10.4
6	7	2.9	20	8.3
7	5	2.1	28	11.7
Total	**220**	**91.7**	**240**	**100**

**Classification applied per question; totals exceed sample size due to repeated measures.*

Table 2 shows the distribution of nurses' knowledge levels across seven questions on diabetic foot ulcer management. The majority of nurses fell into Level 2 (≤50% correct answers), indicating gaps in knowledge, particularly on more complex or specialized questions. While 91.7% of participants were able to answer at least some items correctly, only a small proportion consistently performed above the 50% threshold across all questions, reflecting the need for targeted training interventions.

Table 3. Factors associated with nurses' knowledge level (n = 240)

Criteria	Sub-groups	Level 1 (Mean ±	p-	Level 2 (Mean ±	p-

		SD, 95% CI)	value	SD, 95% CI)	value
Workplace	Gangaram Hospital (n=120)	25.4 ± 6.2 (16.2–30.5)	0.23	53.4 ± 12.6 (35.4–60.3)	0.45
	Mayo Hospital (n=120)	23.2 ± 7.1 (13.3–29.8)		56.4 ± 13.2 (36.6–63.7)	
Wound care experience	< 5 years (n=135)	18.6 ± 5.6 (13.9–22.4)	0.17	59.2 ± 14.2 (39.5–65.3)	0.52
	≥ 5 years (n=105)	20.6 ± 6.0 (15.9–24.8)		57.7 ± 15.3 (37.4–68.8)	
Wound care training	Yes (n=75)	29.5 ± 7.6 (18.9–30.7)	≤ 0.001	32.6 ± 15.2 (24.5–35.5)	≤ 0.001
	No (n=165)	14.3 ± 6.4 (8.2–18.3)		58.3 ± 13.6 (38.8–67.2)	

Table 3 illustrates the relationship between workplace, experience, and training with nurses' knowledge levels. Nurses from Gangaram and Mayo Hospitals showed comparable knowledge scores, with no statistically significant difference. Similarly, wound care experience did not strongly affect knowledge level. However, formal wound care training was significantly associated with higher knowledge scores ($p \leq 0.001$), indicating that training remains a critical factor in improving DFU management competence.

3. Discussion

The present study assessed the knowledge of nurses regarding diabetic foot ulcer (DFU) management in two tertiary hospitals in Lahore. The findings revealed considerable gaps in knowledge, with a majority of nurses classified into the lower knowledge category (≤50% correct responses). These results align with previous studies conducted in different regions, where inadequate awareness of DFU risk factors, preventive measures, and management protocols among nurses has been consistently reported (Zahide & Anita, 2018; Kumarasinghe, Hettiarachchi, & Wasalathanthri, 2018). Such deficiencies in knowledge are particularly concerning given the critical role of nurses in early detection, patient education, and wound care, all of which are essential for preventing avoidable amputations.

Training was found to be the most significant factor influencing knowledge levels, as nurses who had received formal wound care training demonstrated significantly higher knowledge scores than their untrained counterparts. This is consistent with studies from Egypt and Indonesia, where structured training interventions substantially improved nurses' knowledge and practices in diabetic foot care (Rasha & Sally, 2024; Sari et al., 2022). Evidence from South Africa and Vietnam also underscores the importance of targeted education in enhancing both knowledge and confidence among nurses in DFU management (Mafusi et al., 2024; Td et al., 2023). Furthermore, simulation- and online-based education programs have demonstrated effectiveness in strengthening wound care competencies, suggesting that innovative training approaches could be integrated into continuous professional development for nurses (Inkaya, Tuzer, & Elcin, 2020; Aminuddin et al., 2025).

The study findings also emphasize the importance of aligning nursing education with international guidelines, such as those proposed by the International Working Group on the Diabetic Foot (IWGDF), which advocate for systematic risk assessment, patient education, and preventive strategies (Bus et al., 2020). Moreover, studies have shown that theory-based foot care programs for patients can reduce ulcer risk factors and improve self-care behaviors (Nguyen, Edwards, Do, & Finlayson, 2019), highlighting the need for nurse training to be grounded in evidence-based practice. In the broader context, gaps in nurses' knowledge not only reflect institutional challenges but also point toward systemic weaknesses in health system resilience and capacity to address chronic disease complications in low- and middle-income countries such as Pakistan, a challenge also documented in the Vietnamese health system (Oanh, Phuong, & Tuan, 2021). Therefore, investment in nurse education, regular refresher programs, and integration of DFU-specific competencies into standard nursing curricula are

critical to improving outcomes for patients with diabetes in Pakistan.

4. Conclusion

Based on the findings, it is concluded that nurses demonstrated significant knowledge gaps in diabetic foot ulcer management, with training identified as the most influential factor in improving knowledge levels. Therefore, it is recommended that structured, evidence-based training programs be integrated into continuous professional development and nursing curricula to strengthen DFU management and reduce diabetes-related complications.

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