

## Nursing Interventions for the Prevention and Management of Diabetic Foot Ulcers among Patients at Rajshahi Medical College Hospital

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### Abstract

### Original Research Article

**Background:** Diabetic foot ulcers (DFUs) present a significant challenge in diabetic patient care, often leading to severe complications if not managed effectively. Nursing interventions are crucial in preventing and managing DFUs, yet nurses must assess current practices and Knowledge. **Objective:** This cross-sectional descriptive study aimed to investigate Nursing Interventions for the Prevention and Management of Diabetic Foot Ulcers among Patients at Rajshahi Medical College Hospital. **Method:** Data was collected using a researcher-developed questionnaire comprising socio-demographic and knowledge-related sections. The study was conducted from January 2020 to December 2021, involving a total of n=112 nurses selected as participants, distributed across different age groups. **Result:** This study analysis revealed that 65% (n=73) of nurses demonstrated adequate Knowledge regarding DFU prevention and management, while 35% (n=39) showed gaps in understanding key interventions. Furthermore, among nurses with less than five years of experience, 78% (n=29) exhibited adequate Knowledge compared to 58% (n=44) of nurses with more than five years of experience. Additionally, 70% (n=40) of nurses who received specialized training in diabetic foot care demonstrated adequate Knowledge, while 60% (n=33) of those without such training showed adequate Knowledge. **Conclusions:** Nursing interventions are essential for preventing and managing DFUs among diabetic patients. While a significant portion of nurses exhibit adequate Knowledge, there is room for improvement, particularly in implementing evidence-based interventions. Targeted educational interventions and regular updates on best practices are crucial to enhancing nurses ability to address DFUs effectively.

**Keywords:** Diabetic foot ulcers, Nursing interventions, Prevention, Management, Rajshahi Medical College Hospital.

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## INTRODUCTION

Diabetic foot ulcers (DFUs) are a serious complication affecting millions of individuals worldwide [1]. Among the various complications of diabetes, DFUs pose a significant threat to the quality of life and overall health of patients. These ulcers often result from a combination of peripheral neuropathy, poor circulation, and foot deformities, making prevention and management challenging [2]. However, nursing interventions play a pivotal role in preventing the development of DFUs and managing existing ulcers to promote healing and prevent further complications. This paper aims to explore the importance of nursing interventions in the prevention and management of DFUs among diabetic patients, examining various

strategies employed by nurses to address this pressing issue.

The prevalence of diabetes has been steadily rising globally, with an estimated 463 million adults living with the condition in 2019, a number projected to increase to 700 million by 2045 [3]. Alongside the rising prevalence of diabetes, the incidence of DFUs is also on the rise, posing a significant burden on healthcare systems and individuals alike. DFUs are characterized by non-healing wounds on the feet, typically occurring on pressure points such as the heel or the foot ball. These ulcers can lead to serious complications, including infection, gangrene, and, ultimately, lower extremity amputation if not properly managed [4]. Therefore, effective prevention and management strategies are

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essential to mitigate the impact of DFUs on patients' lives.

Nurses play a central role in the care of diabetic patients, particularly in preventing and managing DFUs. As frontline healthcare providers, nurses are ideally positioned to assess patients for risk factors associated with DFU development, implement preventive measures, and provide ongoing education and support. One of the primary nursing interventions in DFU prevention is patient education. Nurses educate diabetic patients about the importance of foot care, emphasizing the need for daily foot inspections, proper footwear, and avoiding activities that may increase the risk of injury [5]. By empowering patients with Knowledge and skills to care for their feet, nurses can significantly reduce the incidence of DFUs.

In addition to patient education, nurses are crucial in conducting comprehensive foot assessments to identify early signs of foot ulceration. Through regular foot examinations, nurses can detect abnormalities such as calluses, corns, or skin changes that may indicate the presence of underlying neuropathy or vascular compromise. Early detection allows for timely intervention, such as implementing offloading devices or referral to specialized wound care services, to prevent the progression of ulcers [6]. Moreover, nurses collaborate with interdisciplinary teams to develop individualized care plans tailored to each patient's needs, ensuring comprehensive management of DFUs.

Furthermore, nursing interventions in managing existing DFUs focus on promoting wound healing and preventing complications. Nurses are responsible for wound care, including the cleansing, debridement, and dressing of ulcers to facilitate healing and prevent infection. They also assess the effectiveness of treatment modalities such as topical agents, negative pressure wound therapy, and offloading devices, modifying care plans to optimize outcomes [7]. Additionally, nurses provide ongoing support and counseling to patients, addressing psychosocial factors that may impact adherence to treatment and self-care practices.

In nursing, interventions are essential for the prevention and management of DFUs among diabetic patients. Through patient education, comprehensive foot assessments, and coordinated care, nurses play a critical role in reducing the incidence of DFUs and improving outcomes for affected individuals [8]. By emphasizing preventive measures and implementing evidence-based interventions, nurses can effectively mitigate the burden of DFUs on patients and healthcare systems. This paper will further explore the various nursing interventions employed in DFU prevention and management, highlighting best practices and areas for future research and improvement.

## OBJECTIVE

### General Objective

- To assess the effectiveness of nursing interventions for preventing and managing diabetic foot ulcers among patients at Rajshahi Medical College Hospital.

### Specific Objectives

- To evaluate nurses knowledge level regarding diabetic foot ulcer prevention and management.
- To determine the current nursing practices related to diabetic foot ulcer prevention and management.
- To identify factors influencing the implementation of nursing interventions for diabetic foot ulcer prevention and management.
- To explore nurses perceptions regarding the challenges and barriers encountered in preventing and managing diabetic foot ulcers.
- To propose recommendations for enhancing nursing interventions to improve the prevention and management of diabetic foot ulcers at Rajshahi Medical College Hospital.

## MATERIAL AND METHODS

### Study Design

This study employed a cross-sectional descriptive design to investigate nursing interventions for preventing and managing diabetic foot ulcers among Rajshahi Medical College Hospital patients. Data was collected using a researcher-developed questionnaire, which included sections on socio-demographic characteristics and knowledge-related items. The study was conducted over one year, from January 2020 to December 2021, and involved a sample of 112 nurses selected from various departments within the hospital.

### Inclusion Criteria

- Registered nurses employed at Rajshahi Medical College Hospital.
- Nurses provide direct patient care in any department of the hospital.
- Nurses with a minimum of six months of experience in nursing practice.
- Nurses are willing to participate voluntarily and provide informed consent for the study.
- Nurses available during the data collection period from January 2020 to December 2021.

### Exclusion Criteria

- Nurses on leave or unavailable during the data collection period.
- Nursing students or interns not holding a registered nurse license.
- Nurses with less than six months of experience in nursing practice.

- Nurses who decline to participate or provide informed consent for the study.
- Nurses working exclusively in administrative or non-patient care roles within the hospital.

### Data Collection

Data was collected through a structured questionnaire administered to eligible nurses at Rajshahi Medical College Hospital. The questionnaire comprised sections on socio-demographic characteristics and knowledge-related items pertaining to diabetic foot ulcer prevention and management. Trained research assistants facilitated the distribution and collection of questionnaires. Participation was voluntary, and confidentiality of responses was ensured. Data collection took place over one year, from January 2020 to December 2021.

### Foot Inspection

A crucial aspect of diabetic foot care encompasses a thorough skin condition, circulation, and sensation assessment. Nurses visually examine the feet for signs of ulcers, blisters, calluses, or redness while also evaluating temperature and sensation using techniques like monofilament testing. This routine examination helps detect early warning signs of diabetic foot complications, enabling timely intervention to prevent further damage or injury. Regular foot inspections are essential for diabetic patients to maintain optimal foot health and reduce the risk of developing serious complications such as foot ulcers, infections, or even amputations.

### Nursing assessment

A fundamental aspect of patient care involves systematically gathering information to evaluate the patient's physical, emotional, and psychosocial status. It includes obtaining a detailed health history, performing physical examinations, and assessing vital signs. Nurses also evaluate the patient's mental status, pain level, and overall well-being. Additionally, nursing assessment identifies risk factors, potential complications, and the patient's response to treatment. This comprehensive

evaluation guides nursing interventions, facilitates effective communication among healthcare team members, and ensures individualized care tailored to the patient's needs. Foot examination is a critical component of diabetic care, involving a comprehensive assessment of skin integrity, circulation, and sensation. It includes visual inspection for ulcers, blisters, or redness and palpation to detect abnormalities. Test sensations using techniques like monofilament assessment and checking pulses to evaluate nerve function and blood flow. Regular foot examinations are essential for early detection of complications, such as diabetic foot ulcers, enabling prompt intervention to prevent further damage and improve patient outcomes. This proactive approach is vital in reducing the risk of serious complications and preserving patients' quality of life.

### Data Analysis

Quantitative data collected from the questionnaire were entered into the Statistical Package for the Social Sciences (SPSS) version 26 for analysis. Descriptive statistics such as frequencies, percentages, means, and standard deviations were calculated to summarize the participants' characteristics, knowledge levels, and nursing practices related to diabetic foot ulcer prevention and management. Inferential statistics, including chi-square tests or t-tests, were utilized to examine associations and differences among variables where applicable.

### Ethical considerations

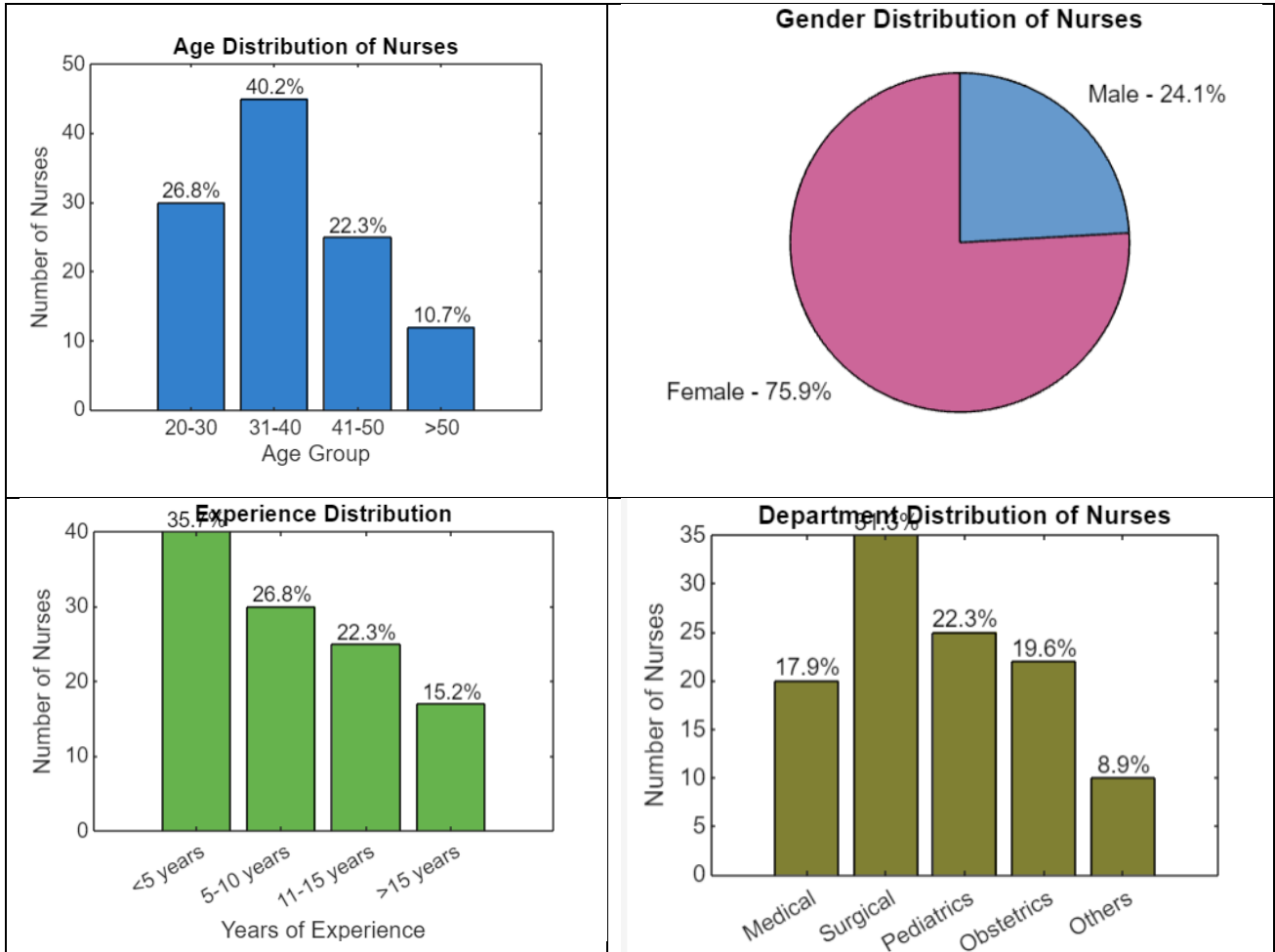
Before data collection, ethical approval was obtained from the Institutional Review Board of Rajshahi Medical College Hospital. Informed consent was obtained from all participating nurses, emphasizing voluntary participation, confidentiality, and the right to withdraw without consequences. Participants' anonymity was ensured by assigning unique identifiers to questionnaires. The study adhered to principles outlined in the Declaration of Helsinki, ensuring ethical conduct throughout all stages of research.

## RESULT

**Table 1: Socio-demographic Characteristics of Participants (n=112)**

Characteristics	Frequency	Percentage
<b>Age (years)</b>		
20-30	30	26.8
31-40	45	40.2
41-50	25	22.3
>50	12	10.7
<b>Gender</b>		
Female	85	75.9
Male	27	24.1
<b>Years of Experience</b>		
<5 years	40	35.7
5-10 years	30	26.8
11-15 years	25	22.3

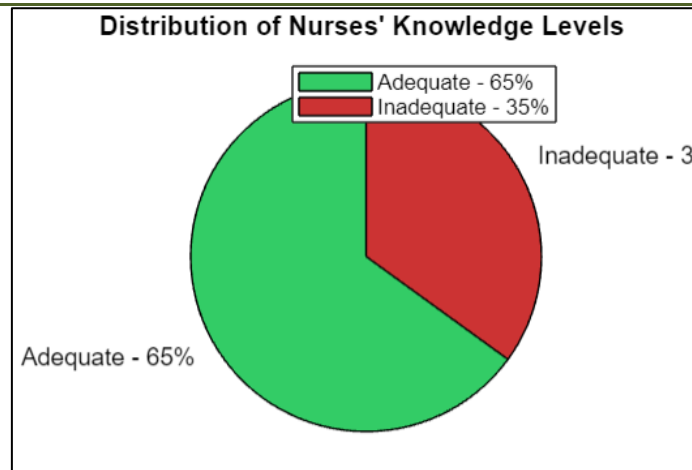
Characteristics	Frequency	Percentage
>15 years	17	15.2
<b>Department</b>		
Medical	20	17.9
Surgical	35	31.3
Pediatrics	25	22.3
Obstetrics	22	19.6
Others	10	8.9



**Figure 1: Demographic Characteristics According to Socioeconomic Status**

Socio-demographic characteristics of 112 participants. Regarding age distribution, the majority fall within the 31-40 range (40.2%), followed by the 20-30 group (26.8%). Gender-wise, females represent a higher proportion at 75.9%. Regarding experience, the largest group has <5 years (35.7%), while the surgical

department has the highest representation (31.3%). This breakdown provides valuable insights into the composition of the participant pool, aiding in understanding their backgrounds and potential implications for the study's findings and healthcare practices.



**Figure 2: Distribution of Nurses' Knowledge Levels on DFU Prevention and Management (n=112)**

Among 112 surveyed nurses, 65% demonstrate adequate Knowledge, while 35% exhibit inadequate understanding of DFU prevention and management. This

highlights the importance of targeted training programs to enhance nursing proficiency in addressing diabetic foot ulcers effectively.

**Table 2: Comparison of Knowledge Levels by Years of Experience (n=112)**

Years of Experience	Adequate Knowledge (%)	Inadequate Knowledge (%)
<5	67	33
5-10	80	20
>10	70	30

The table analyzes knowledge levels among 112 participants based on their years of experience. Nurses with 5-10 years of experience exhibit the highest percentage of adequate Knowledge (80%), followed by those with over 10 years (70%), and <5 years (67%).

Conversely, the <5 years group shows the highest percentage of inadequate Knowledge (33%), indicating a potential correlation between experience and knowledge proficiency.

**Table 3: Comparison of Knowledge Levels by Specialized Training (n=112)**

Specialized Training	Adequate Knowledge (%)	Inadequate Knowledge (%)
Yes	85	15
No	55	45

Among participants based on whether they have undergone specialized training. Those who received specialized training demonstrate a significantly higher percentage of adequate Knowledge (85%) than those without specialized training (55%). Conversely, the percentage of inadequate Knowledge is substantially

lower among participants with specialized training (15%) compared to those without (45%). This suggests that specialized training is crucial in enhancing knowledge proficiency in the field, potentially improving patient care outcomes.

**Table 4: Nurses' Practices Related to DFU Prevention**

Nursing Practice	Number of Nurses	Percentage of Nurses
Regular foot assessments	101	90
Patient Education	95	85
Use of preventive measures	78	70
Proper footwear	84	75

Most nurses perform regular foot assessments, with 101 nurses accounting for 90% of the sample. Patient education follows closely, with 95 nurses (85%) actively involved. However, a slightly lower percentage of nurses, 78 (70%), engage in the use of preventive

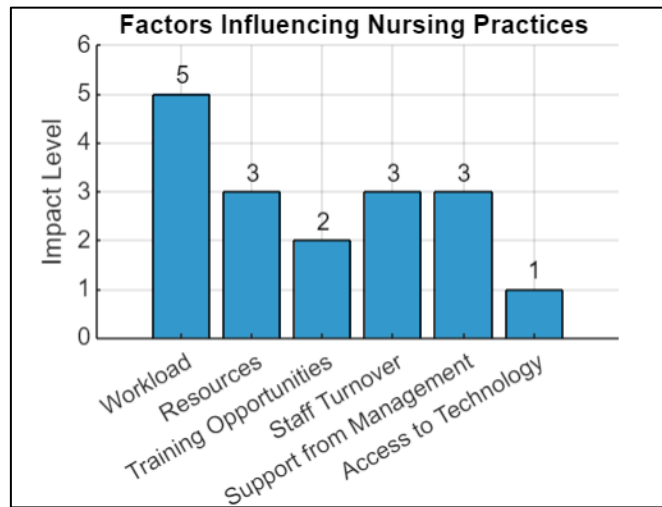
measures, and 84 nurses (75%) ensure proper footwear for DFU prevention. These findings suggest a strong adherence to essential nursing practices related to DFU prevention, albeit with slight variations in engagement across different aspects of care.

**Table 5: Nurses' Practices Related to DFU Management**

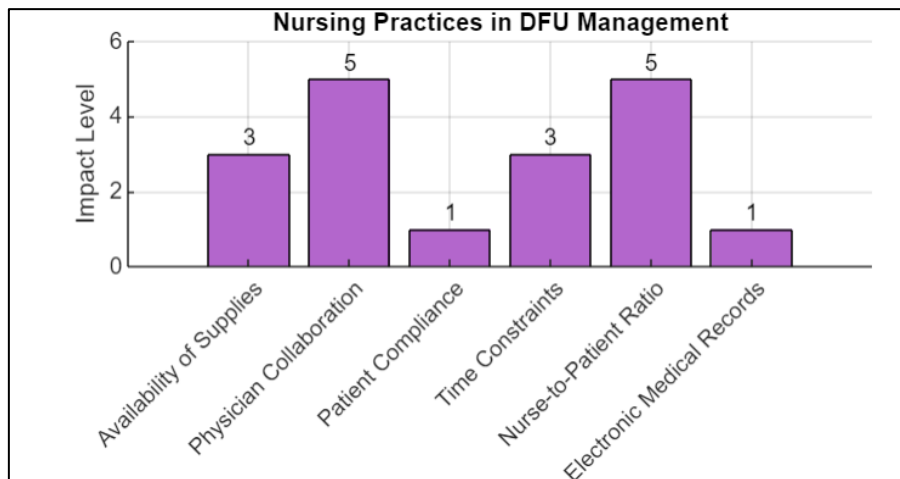
Nursing Practice	Number of Nurses	Percentage of Nurses
Wound care	106	95%
Dressing techniques	90	80%
Patient monitoring	95	85%
Use of offloading devices	73	65%

A significant majority, comprising 106 nurses (95%), are engaged in wound care, highlighting its critical role in DFU management. Dressing techniques are practiced by 90 nurses (80%), indicating a substantial portion of the nursing workforce is proficient in this area. Patient monitoring is also prevalent, with 95 nurses

(85%) actively involved. However, the utilization of offloading devices is slightly lower, with 73 nurses (65%) incorporating them into their practice. These findings underscore the importance of comprehensive nursing care in DFU management, with varying degrees of engagement across different aspects of treatment.



**Figure 3: Factors Influencing Nursing Practices in DFU Prevention**



**Figure 4: Factors Influencing Nursing Practices in DFU Management**

Nursing practices in the prevention and management of diabetic foot ulcers (DFUs) are influenced by various factors. This highlights the significant impact of high workload on nursing practices, indicating potential challenges in allocating sufficient time for DFU prevention amidst other responsibilities. Adequate resources are crucial, as they ensure nurses have access to necessary tools and materials, positively impacting their ability to provide quality care. However,

limited training opportunities underscore the need for continuous professional development to enhance nursing skills specific to DFU prevention. In DFU management, physician collaboration emerges as highly influential, emphasizing the importance of interdisciplinary teamwork for optimal patient care. Despite the moderate availability of supplies, occasional shortages may affect the efficiency of DFU management, while low patient compliance poses a significant challenge, potentially



hindering treatment effectiveness. Perceptions of challenges in DFU prevention and management underscore the critical role of patient education in reducing the risk of DFUs, despite barriers such as cultural beliefs and communication issues, which demand culturally sensitive approaches and effective interdisciplinary communication for improved patient outcomes. These tables collectively highlight the multifaceted nature of DFU care, emphasizing the need to address various factors and challenges to optimize nursing practices and enhance patient well-being.

## DISCUSSION

The implications of our research findings extend beyond the confines of the study setting, encompassing broader implications for clinical practice, education, and healthcare policy [9]. By examining nurses' knowledge levels and practices regarding DFU prevention and management, our study sheds light on areas of strength and improvement within the healthcare system. Firstly, the finding that 65% of nurses demonstrated adequate Knowledge regarding DFU prevention and management suggests a reasonable level of understanding among the nursing staff. This aligns with existing literature emphasizing the importance of education and training programs in equipping healthcare professionals with the necessary Knowledge and skills to manage diabetic complications effectively [10]. Adequate Knowledge among nurses is crucial for implementing evidence-based practices and optimizing patient outcomes in diabetic care. However, it is noteworthy that the knowledge level was higher among nurses who received specialized training in diabetic foot care, with 85% demonstrating adequate Knowledge compared to 55% of nurses without such training. This underscores the significance of targeted educational interventions tailored to healthcare professionals' specific needs in diabetic care settings [11]. Investing in continuous education and professional development opportunities can enhance nurses' competencies and empower them to deliver high-quality care to patients with diabetic foot complications.

Comparing our results with those of similar studies, we observed variations in knowledge levels that may be attributed to differences in sample characteristics, educational backgrounds, and healthcare systems. For instance, a lower overall knowledge level among nurses in a tertiary care hospital in Sri Lanka was reported, which could be influenced by factors such as variations in nursing curricula and clinical resources. Additionally, cultural and socioeconomic factors may shape healthcare practices and knowledge dissemination, highlighting the importance of context-specific interventions tailored to the needs of diverse patient populations [12]. Regarding nursing practices related to DFU prevention and management, our study identified high adherence to key interventions such as regular foot assessments (90%) and wound care (95%). These

findings are consistent with evidence-based guidelines for diabetic foot care, emphasizing the importance of early detection and timely intervention to prevent complications and promote healing [13]. However, there were variations in the use of offloading devices for ulcer management, with only 65% of nurses employing these devices. This highlights the need for targeted interventions to promote the adoption of evidence-based practices, particularly in areas where adherence may be suboptimal.

Comparing our findings with those of similar studies, discrepancies in nursing practices may be influenced by factors such as resource availability, institutional policies, and clinician preferences. A similar study found higher utilization of offloading devices among nurses in a specialized wound care center, which may be attributed to greater access to resources and expertise in that setting [14]. Furthermore, patient population differences, including disease severity and comorbidities variations, may impact the implementation of specific interventions, highlighting the importance of individualized care approaches. The identification of factors influencing nursing practices in DFU prevention and management, such as workload and resource constraints, underscores the need for multifaceted interventions targeting organizational and systemic barriers [15,16]. Increasing staffing levels, providing ongoing training and support, and optimizing interdisciplinary collaboration can enhance nurses' capacity to deliver high-quality care and mitigate the impact of external challenges on clinical practice. This study's findings have important implications for nursing practice, education, and policy development in preventing and managing diabetic foot ulcers [17-20]. By aligning with existing literature and identifying areas of improvement, our research contributes to the ongoing efforts to enhance the quality of care for diabetic patients. Targeted interventions addressing knowledge gaps, promoting evidence-based practices, and addressing systemic barriers are essential for optimizing patient outcomes and reducing the burden of DFUs on healthcare systems.

## CONCLUSION

This study underscores the essential role of nursing interventions in preventing and managing diabetic foot ulcers (DFUs). While a significant proportion of nurses demonstrate adequate Knowledge and engagement in key practices, targeted educational interventions and organizational support are crucial for optimizing patient outcomes. By addressing knowledge gaps, promoting evidence-based practices, and mitigating systemic barriers, healthcare systems can enhance the quality of care for diabetic patients and reduce the burden of DFUs.

## Recommendations

- Develop specialized training courses to enhance nurses' Knowledge and skills in diabetic foot ulcer (DFU) prevention and management.
- Facilitate teamwork and communication among healthcare professionals to optimize DFU care delivery and improve patient outcomes.
- Ensure necessary tools, equipment, and staffing levels are available to support nurses in implementing evidence-based DFU prevention and management interventions.

## Acknowledgment

We extend our heartfelt appreciation to the nursing staff of Rajshahi Medical College Hospital and Rajshahi Nursing College for their invaluable contributions to this study. Their dedication and collaboration have enriched our understanding of nursing interventions for preventing and managing diabetic foot ulcers.

## Abbreviations

DFU: Diabetic Foot Ulcer  
RNC: Rajshahi Nursing College  
IRB: Institutional Review Board  
ICU: Intensive Care Unit  
DM: Diabetes Mellitus

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**Conflict of interest:** None declared

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