Volume 3, Issue 3, 2025

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

ASSESSING THE KNOWLEDGE, PRACTICES, AND CHALLENGES FACED BY NURSES IN THE EARLY DETECTION AND PREVENTION OF DIABETIC FOOT ULCER COMPLICATIONS A DESCRIPTIVE CROSS-SECTIONAL STUDY

Muhammad Latif[*1], Laila Manzoor[2], Anum Shahzadi[3], Hafiz Abdul Wajid[4], Samina Khalil[5], Naveed Hussain[6], Sadaf latif[7], Waheed Ul Zaman[8]

*[*1 8]Department of Nursing King Edward Medical Univesity Lahore Pakistan*
[2 5 7]Nursing Officer Bahawal Victoria Hospital Bahawalpur Pakistan
[3]Nursing Officer Shaukat Khanum Memorial Cancer Hospital and Research Center Lahore Pakistan
[4]University of Health Science Lahore Pakistan
[6]Naushehro Feroze Institute of Nursing

[*1]latifqureshi077@gmail.com, [2]lailamanzor@gmail.com, [3]ianum.shahzadi@gmail.com, [4]hafiz2k1@gmail.com, [5]saminakhalil102727@gmail.com, [6]naveedhussainkorai0@gmail.com, [7]sadafshahid267@gmail.com, [8]03067890453r@gmail.com

DOI: https://doi.org/10.5281/zenodo.15331904

Keywords
Diabetic foot care, nursing, early diagnosis, prevention, diabetes complications, health care, knowledge, performances, impediments, wound management

Article History
Received on 25 March 2025
Accepted on 25 April 2025
Published on 03 May 2025

Corresponding Author: *
Muhammad Latif

Abstract

Diabetic foot complications are one of the frequent and serious diabetogenic outcomes that result from diabetes mellitus and that can cause such consequences as amputation, infection, and other dangerously hazardous conditions. Diabetic foot complications are foreseen-through knowledge, practices, and interventions by the nurses in the early stage. The purpose of this research is to determine the awareness, practice and challenges that faces nurses in early identification, prevention and management of diabetic foot complications. The information was gathered through administering structured questionnaires for the nurses in the diabetic clinics, general wards, along with wound care units. With the results of the study it is realized that although the Kenyan nurses have a minimum understanding about diabetic foot care there are some barriers including; inadequate education, time and resources that limit the adoption of proper preventive measures among diabetic patients. This also points to the need for proper training and political support to improve the nurse's capacity to prevent further complications to diabetes in the foot. This pertains to the need for enhancing educational interventions and materials for nursing care for patients with diabetes particularly in diabetes-related foot complications; including what can be done generally for purposes of enhancing better patient outcomes in terms of minimizing cases of amputation and severe complications among patients with diabetes.

INTRODUCTION

Diabetic foot ulcers (DFUs) are a serious complication of diabetes, which contribute to increased morbidity, reduced quality of life, and increased health costs. For both the prevention and treatment of DFUS, effective

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ISSN: (e) 3007-1607 (p) 3007-1593

care interventions are extremely important as they can help reduce risk of infection, amputation of the lower extremities, and long hospital stays. This proposal aims to examine evidence-based care strategies that improve patient outcomes through a large-scale care approach. With changing lifestyle and industry progress, the prevalence of diabetes and its complications are increasing. Under these complications, diabetic foot ulcers are one of the most common and most serious concerns. Nurses play an important role in diabetes management, including prevention, early detection, patient care, and community explanations. Your responsibility is extended through health care, coordination of the health system, and improving the overall lives of diabetics. Their roles in patient care include monitoring skin integrity, assessing foot care, wound management, and using advanced techniques for treatment. Additionally, nurses support patients with DFU or amputation in rehabilitation in rehabilitation in restoration of mobility and independence. Given the developmental nature of the diabetic foot supply, special training is important to ensure that nurses are updated with latest guidelines and best practices and ultimately improve patient care and health outcomes. One of the most serious complications of diabetes is diabetic foot disease. This can lead to infections, ulcers and amputations if not treated properly. Nurses play an important role in reducing these risks through early detection, preventive education, screening, and evidence-based interventions. The global prevalence of diabetes has increased significantly over the past 20 years, particularly in countries with low and medium incomes (LMICs). At this point, an estimated 460 million adults worldwide live with diabetes, an increase of 62% compared to 285 million in 2009. This number is expected to reach approximately 578 million by 2030. Under various types of diabetes, type 2 diabetes is most common in LMIC, but other forms such as gestational diabetes also contribute to the burden of the disease. By improving nurses' knowledge and skills, the health system can improve patient outcomes, reduce complications, and optimize resource.

Diabetes mellitus is a rising epidemic as currently it affects 537 million adults globally and the figure is predicted to increase to 783 million in 2045. Diabetic foot ulcers (DFUs) are one of the describing complications of diabetes due to their devastating effects that result in increased hospitalization time and amputations of lower limbs. Diabetes mellitus peripheral neuropathy can lead to foot ulcer in about 15- 25 % of the diabetic population with further complications such as morbidity and mortality. As for Pakistan, it can be surely stated that the number of people with diabetes and its complications increases every year to the detriment of an already struggling healthcare system.

Identifier and prevention of diabetic countries are significant factors in decreasing the chances of ulceration and amputation management. Nurses, as providers of basic first line in health care, are in vantage position of offering foot care check, screening and giving long explanation in regard to self care. This last aspect of nursing is critical in not only recognizing the first indications of such complications but also in administering intercessions that will definitely enhance the quality of patients' lives. However, the study of the patient outcomes depends on the nurses' knowledge, practices regarding diabetic foot care, availability of resources, as well as problems observed during their practice.

However, the information regarding how such vital healthcare workers are equipped in this part of the world especially Pakistan is scarce; especially in areas such as Bahawalpur, the following study aimed at determining the preparedness of the nurses in managing diabetic foot care. It is crucial to assess their existing comprehension of effective therapeutic practices, current organizational habits, and the cancer care system they face in order to create specific proposals and enhance the level of this important service.

This study is therefore important so as to fill this knowledge gap by establishing a correlation from the nurses practicing in the public and the private hospitals within Bahawalpur. The results will be useful to health care authorities, educators of nursing students or future professionals, and managers of hospital organizations to identify possible points of development, both for staff training, material and human resource supply, and future communication with patients.

The rationale for this study is to evaluate the awareness level, and implementation of measures as well as the barriers to early identification and

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ISSN: (e) 3007-1607 (p) 3007-1593

prevention of complications of diabetic foot ulcers among the nurses. The study therefore aims at evaluating both quantitative and qualitative aspects of nursing care in order establish gaps, find out implementing challenges and effective practices in foot care among diabetic patients. These objectives of this study will help complement the reform of nursing education curricula, build development of clinical protocols, as well as mitigate cases of severe diabetic foot ulcers among diabetic patients.

Literature Review

The development of diabetic foot ulcers (DFUs) is influenced by multiple factors, including peripheral neuropathy, peripheral arterial disease (PAD), and biomechanical abnormalities. Neuropathy, which affects nearly half of individuals with type 2 diabetes, leads to sensory impairment, foot deformities, and increased vulnerability to injuries. Additionally, research suggests that PAD, a condition caused by atherosclerosis-related arterial blockages, affects approximately 50% of diabetic patients with foot ulcers, further complicating the healing process. The economic impact of DFUs is substantial, encompassing both direct medical costs and indirect costs related to disability and reduced productivity.

Diabetes mellitus is recognized as a significant global health concern, often described as a pandemic due to its rising prevalence. According to the International Diabetes Federation, the number of individuals living with diabetes is projected to reach nearly 700 million by 2045. In Italy, an estimated 5.3% of the population roughly 3 million individuals have been diagnosed with diabetes, while an additional 1 million remain undiagnosed. The incidence of diabetic foot lesions is approximately 2% annually, with a lifetime occurrence ranging between 19% and 34%. Moreover, recurrence rates remain high, with 40% of ulcers reappearing within the first year of healing and 65% within three years. Given its profound impact on disability and healthcare costs, diabetic foot disease is ranked among the top 10 most burdensome medical conditions. While preventive measures such as routine foot examinations, appropriate footwear, and strict glycemic control are recommended, further research is needed to identify the most effective strategies for minimizing ulcer incidence and enhancing patient outcomes.

As a leading non-communicable disease, diabetes places immense strain on healthcare systems worldwide. The increasing prevalence of diabetes, driven by lifestyle changes and industrialization, has contributed to a rise in complications, particularly diabetic foot ulcers. Nurses play a pivotal role in diabetes management, focusing on preventing complications such as DFUs, infections, and amputations. This literature review examines the critical role of nurses in diabetic foot prevention, care, and rehabilitation, emphasizing their contributions to patient education, clinical management, and healthcare system support.

Studies highlight the importance of nurses in diabetes prevention through education and early intervention. Nurse-led programs focus on lifestyle modifications, glucose monitoring, and foot care awareness, which have been shown to reduce the risk of diabetic foot complications. Effective education initiatives improve patient adherence to foot care guidelines, ultimately reducing the incidence of ulcers and amputations.

Nurses specializing in diabetes care provide essential guidance on foot hygiene, appropriate footwear selection, and daily self-examinations. They also educate patients on recognizing early warning signs of diabetic foot complications, such as changes in skin color, temperature, or sensation. Structured education programs delivered by nurses have been associated with better patient outcomes, underscoring the significance of nursing interventions in diabetic foot prevention.

To deliver high-quality diabetic foot care, nurses require specialized training in foot assessment, wound management, and advanced treatment techniques. Continuing education programs equip nurses with the latest evidence-based practices, enhancing their ability to prevent, detect, and manage diabetic foot complications effectively. However, studies indicate that a significant proportion of nurses approximately 66%lack formal training in diabetic foot care, highlighting the urgent need for structured educational programs to address this gap.

The implementation of standardized diabetic foot care protocols has demonstrated improvements in patient outcomes and cost-effectiveness within healthcare systems. Investing in nurse training programs is crucial to strengthening diabetes management and reducing the burden of diabetic foot

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ISSN: (e) 3007-1607 (p) 3007-1593

complications. Encouraging nurses to engage in both theoretical and hands-on training will enhance their ability to provide comprehensive diabetic

Research Objectives

A research determined knowledge and clinical practice levels among nurses related to fast diabetic foot complication detection together with prevention methods at Bahawalpur hospitals throughout the research period.

Deep examination of how nurse-driven approaches perform to minimize diabetic foot ulcer development in diabetic patients through foot examination and educational programs for patients and professional wound management methods.

Medical faculty members want to discover main obstacles which comprise institutional limitations and resource scarcity together with limited educational capabilities that block nurses from achieving efficient diabetic foot care techniques.

The investigation determines the correlation between nurses' educational understanding and their adoption of diabetic foot preventive actions inside the research context.

Research Hypotheses

H1: The level of knowledge of nurses is significantly associated with their clinical practices of early detection and prevention of diabetic foot ulcer complications.

H2: The nurse led interventions are quite effective in reducing the incidence of diabetic foot complications in diabetic patients.

H3: Nurses with knowledge in diabetic foot care by means of training show higher effectiveness in implementing prevention strategies than nurses with no formal training.

H4: The challenges of an institution and resources are significantly barriers in the application of effective diabetic foot care practices by nurses.

MATERIAL AND METHODS

Study Design

A descriptive cross-sectional design varied the methods through quantitative and qualitative assessment of nurses' knowledge about diagnosis and prevention of diabetic foot ulcer (DFU) complications and their associated practices and obstacles.

Study Setting

The investigation took place in various public and private health facilities in Bahawalpur Pakistan by observing departments active in diabetic care services including diabetes clinics together with wound care units and general medical wards.

Duration of Study

Research activities spanned six months beginning from May 1 2025 through October 31 2025.

Sample Size

The researcher included 150 participants in the study. A total number of 120 practicing nurses who managed diabetic patients were included alongside 30 diabetic patients who received educational screening about foot care from the selected nurses.

Sampling Technique

Non-probability purposive sampling enabled researchers to pick nurses specifically working with diabetic foot care patients.

Sample Selection

Inclusion Criteria

- The research included both public and private hospital nurses practicing in Bahawalpur.
- Nurses who were actively participating in diabetic foot care practices as well as education delivery and screening services.
- The selected nurses who granted permission to take part in the study.
- The selected nurses deliver both screening and educational foot programs to their diabetic patient audience.

Exclusion Criteria

- The research excluded nurse professionals who did not deliver medical treatment directly to diabetic patients.
- Student nurses or nursing interns.
- The study excluded nurses who dedicated their practice to non-clinical administration work.
- Medical staff must exclude diabetic patients who render consent inaccessible because of mental disabilities and cognitive limitations from the study.

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Methodology

Participants

Amongst the participants 120 registered nurses took part because they devoted their practice to diabetic patient care. A separate group of 30 diabetic patients participated in observational data collection because they had experienced foot care education or screening provided by the nurses under study.

Data Collection Methods

1. Survey Questionnaires

Nurses participated in an organized survey to evaluate Behavior Improvement and Clinical Competency and Hierarchical Behavior.

Knowledge of diabetic foot complications and early signs.

The nurses demonstrated their competence regarding three essential clinical procedures: foot examination protocol and patient hand washing education and managing foot wounds.

Attitudes toward preventive care and early detection of DFU.

2. Semi-Structured Interviews

Research investigators selected and interviewed a small number of nurses in an exploratory fashion to achieve their study goals. These interviews explored:

- The nurses faced different obstacles when they implemented treatments for patients with diabetic foot complications.
- Institutional support, resource availability, and interprofessional collaboration.
- The interviews evaluated nurses' actual experiences along with obstacles they face in preventing DFU occurrences.

3. Patient Foot Assessment Documentation

The researchers obtained consent from patients so they could observe how nurses performed their foot assessments. This included:

- The interviews investigated how nurses perform foot examinations when applied to their professional practice.
- Patients receive educational advice about foot self-care, footwear selection and personal hygiene practices from the nurse.
- Nurses implement preventive methods to minimize the risk of DFU development for patients.

Data Analysis

- **Quantitative Data:**

The data received through structured questionnaires underwent analysis through SPSS version 26 for coding. The analysis used descriptive statistics with means in combination with frequencies and percentages to present the main summary points about the data. The sample analysis employed Chi-square tests and Pearson's correlation as inferential methods to identify relationships between clinical practices together with knowledge and experience in diabetic foot care management.

Qualitative Data:

The researchers used thematic content analysis to study the interview transcripts after transcribing them. The researchers manually examined emerging trends to identify the shared difficulties and knowledge deficiencies and institutional hindrances affecting nurse performance in diabetic foot care management.

Ethical Approval

The study received ethical clearance through the Institutional Review Board (IRB) operating at participating hospital institutions. The participants furnished written informed consent to the study personnel before researchers collected data. Throughout the research participants received absolute confidentiality along with discreet conditions and complete discretion regarding their withdrawal right from the research at any point.

Instrument Validation

The research instrument recovered from literature obtained its application after modifications for use locally. The researchers tested the clarity and reliability of their instrument along with its applicability by conducting tests on 10 nursing staff members. New modifications emerged because of the information gathered from participants. The following version of the instrument reached an acceptable level of internal consistency after validation as demonstrated through a Cronbach's alpha score of 0.78.

Limitations of the Methodology

- The research used a non-probability sampling design and this approach could reduce the

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applicability of its discovered results to a broader audience.

- The participants may alter their responses due to social desirability bias thereby weakening the accuracy of their self-reported data.
- Because of its design the study lacked capacity to examine causal relationships and long-term changes in the variables.
- Due to restricted resources and time limits the observational research for nurse care practices remained insufficient to validate.

OPERATIONAL DEFINITIONS

Diabetic Foot Complications

Diabetic foot complications observed clinically included three conditions which were ulcers, infections, and amputations of the lower limbs in diabetic patients. Data collection about diabetic foot complications occurred through official nursing logs and patient foot assessment documentation as well as direct observations in care settings. The study considered any manifestation of foot ulcer, infection, gangrene or lower limb amputation as a complication during the observation period.

Early Detection

1. The extent and frequency of regular foot check-ups performed by nurses served as the measure for early detection. This included:
2. Nurses performed foot screenings on what number of patients throughout each week.
3. Nurses utilized standardized instruments including monofilament test equipment together with visual screening tools as part of their assessment practice.
4. Documentation of early signs such as calluses, skin discoloration, or minor wounds. The practice of screening patients with feet once weekly alongside the use of assessment tools led nurses to be considered effective at early detection.

Prevention Strategies

Prevention strategies represented the planned actions nurses use to minimize risks that diabetic foot complications would occur. These were assessed through:

- Self-reported practices in survey questionnaires.
- Observation of foot care education sessions.

The documentation system provided evidence about nurses' advice to patients regarding diabetes footwear selection and hygiene practices and blood sugar management. Nurses who delivered three or more foot hygiene education and glycemic control guidance and wound care and footwear recommendations were considered practitioners of effective prevention measures.

Nurse-led Interventions

Nurses through their leadership position designed and executed direct care activities combined with educational programs which they led to patients. These included:

Nurses must provide educational sessions for diabetic foot care to patients.

- Routine foot inspections and dressing of minor wounds.
- Referrals to specialists when necessary. The researchers assessed these interventions through a combination of clinical notes inspection and nurse logs examination and patient report evaluation. A nurse who conducted two or more tasks related to their routine work qualified their practice as nurse-led interventions.

Knowledge and Practices of Nurses

The structured questionnaire served as the diagnostic tool for the study.

The Knowledge Section included 15 multiple-choice questions to evaluate nurse understanding regarding risk factors and foot complication signs and care delivery procedures.

The practice section included ten questions about the frequency and types of foot care procedures which nurses carried out. Knowledge was categorized as:

- Good Knowledge: ≥75% correct answers.
- Moderate Knowledge: 50–74% correct answers.
- Poor Knowledge: <50% correct answers.

A score of good practice required the appropriate execution of at least 5 core activities at least once per week.

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DATA COLLECTION PROCEDURE

Identification of the Study Variables

Independent Variables:

- Nurses' demographic characteristics (age, gender, education level, years of experience, professional training in diabetic foot care)
- Institutional factors (availability of resources, staff-to-patient ratio, support from administration)

Dependent Variables:

- Knowledge level of nurses regarding diabetic foot assessment and complications
- Clinical practices and preventive strategies employed by nurses
- Challenges and barriers faced by nurses in providing diabetic foot care
- Effectiveness of nurse-led interventions in preventing diabetic foot complications

Methods for Collection of Data

The data were collected from registered nurses working in diabetes clinics, wound care units, and general medical wards of public and private hospitals in Bahawalpur. Prior permission was obtained from hospital administration, and ethical clearance was secured before data collection began.

Participants were approached during their shifts and briefed about the purpose of the study. Informed consent was taken from those willing to participate. The data were gathered using both quantitative and qualitative methods to ensure a comprehensive understanding of the topic.

Data Collection Tools

1. Structured Questionnaire (Quantitative Tool)

A self-administered structured questionnaire was used to assess:

- **Knowledge** of nurses regarding diabetic foot complications (including causes, signs, risk factors, and preventive strategies)
- **Practices** in foot examination, patient education, and wound care
- **Nurse-led interventions** routinely performed in their workplace

The questionnaire consisted of multiple sections including:

- Demographics
- Knowledge-based multiple-choice questions
- Practice-based Likert scale items
- Checklist of preventive strategies

The questionnaire was validated by subject experts and piloted on 10 nurses (not part of the study sample) to ensure clarity and reliability.

2. Semi-Structured Interview Guide (Qualitative Tool)

Semi-structured interviews were conducted with a subset of 15 nurses to explore:

- Perceived barriers and challenges in diabetic foot care
- Institutional or patient-related factors affecting care delivery
- Suggestions for improving diabetic foot care practices
- Interviews were audio-recorded (with consent) and transcribed for thematic analysis.

This data collection approach ensured triangulation of information, providing both measurable insights and a deeper understanding of the lived experiences of nurses involved in diabetic foot care.

DATA ANALYSIS PROCEDURE

All collected data were entered and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Both quantitative and qualitative data were analyzed using appropriate methods as described below:

Quantitative Data Analysis

The quantitative data obtained through structured questionnaires were analyzed using descriptive and inferential statistics:

1. Descriptive Statistics

- Frequencies and Percentages were calculated for categorical variables such as:
- Gender
- Educational qualification
- Department of work
- Training in diabetic foot care
- Common barriers identified
- **Means and Standard Deviations (SD)** were calculated for continuous variables such as:
- Age
- Years of experience
- Composite knowledge and practice scores

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2. Inferential Statistics

- Chi-square test was used to assess associations between categorical variables (e.g., training received vs. level of knowledge).
- Independent Samples t-test was applied to compare the mean knowledge and practice scores between two independent groups (e.g., trained vs. untrained nurses).
- One-Way ANOVA was used for comparing means across more than two groups (e.g., knowledge scores by years of experience categories).
- Pearson correlation coefficient (r) was computed to evaluate the relationship between nurses' knowledge scores and practice scores.

Level of significance was set at $p < 0.05$.

Qualitative Data Analysis

The data obtained from semi-structured interviews were transcribed verbatim and analyzed using thematic analysis. The process included the following steps:

- Familiarization with the data
- Coding relevant segments of text
- Grouping codes into categories
- Identifying recurring themes related to:
- Challenges in diabetic foot care
- Institutional barriers
- Perceived efficacy of nurse-led interventions

NVivo software version 12 may be used for organizing and managing qualitative data for deeper thematic exploration if required.

RESULTS

Demographic Characteristics of Participants

A total of 150 nurses participated in the study. The demographic details of the respondents are summarized below:

Variable	Frequency (n)	Percentage (%)
Age		
< 30 years	45	30%
30–40 years	60	40%
41–50 years	30	20%
> 50 years	15	10%
Gender		
Male	60	40%
Female	90	60%
Qualification		
Diploma	50	33.3%
BSN	75	50%
MSN	25	16.7%
Years of Experience		
< 5 years	45	30%
5–10 years	60	40%
> 10 years	45	30%

Knowledge of Diabetic Foot Care

The nurses' knowledge regarding diabetic foot complications was assessed using multiple-choice questions.

Table 2 shows the results of the knowledge assessment.

Knowledge Item	Correct Responses (n)	Percentage (%)
Common causes of diabetic foot ulcers (Neuropathy)	120	80%

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Frequency of foot examinations for diabetic patients	130	86.7%
Signs of diabetic foot complications	125	83.3%
Tools used to assess foot sensation (Monofilament)	110	73.3%
Importance of patient education on foot care	140	93.3%

The overall **mean knowledge score** was 78%, with a **standard deviation of 9.3**.

Nurses' Practices in Diabetic Foot Care

Nurses' practices related to diabetic foot care were assessed on a Likert scale (1 = Never, 5 = Always). Table 3 presents the mean responses for various practices.

Practice Item	Mean Score (SD)
Examine patients' feet for wounds and pressure points	4.5 (0.6)
Educate patients on daily foot hygiene	4.7 (0.5)
Advise patients to avoid walking barefoot	4.3 (0.8)
Refer patients to specialists when complications arise	4.0 (0.9)

The overall mean practice score was 4.4 (SD = 0.7), indicating that nurses regularly engage in these practices.

Barriers in Diabetic Foot Care

The barriers faced by nurses in providing optimal diabetic foot care were explored using a checklist. Table 4 summarizes the most common challenges identified by the nurses.

Barrier	Frequency (n)	Percentage (%)
Lack of training in diabetic foot care	50	33.3%
Time constraints due to high patient load	80	53.3%
Lack of resources (e.g., foot examination tools)	40	26.7%
Patient non-compliance	70	46.7%
Inadequate support from administration	30	20%

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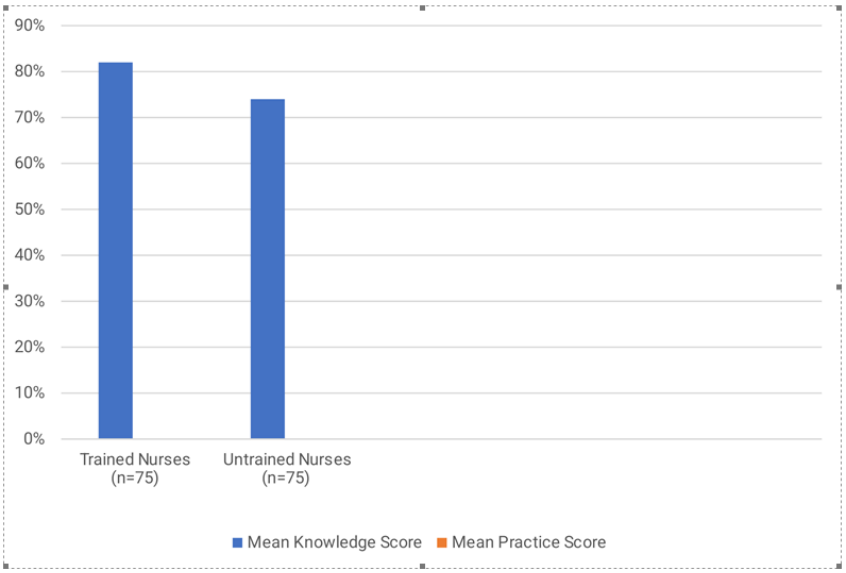


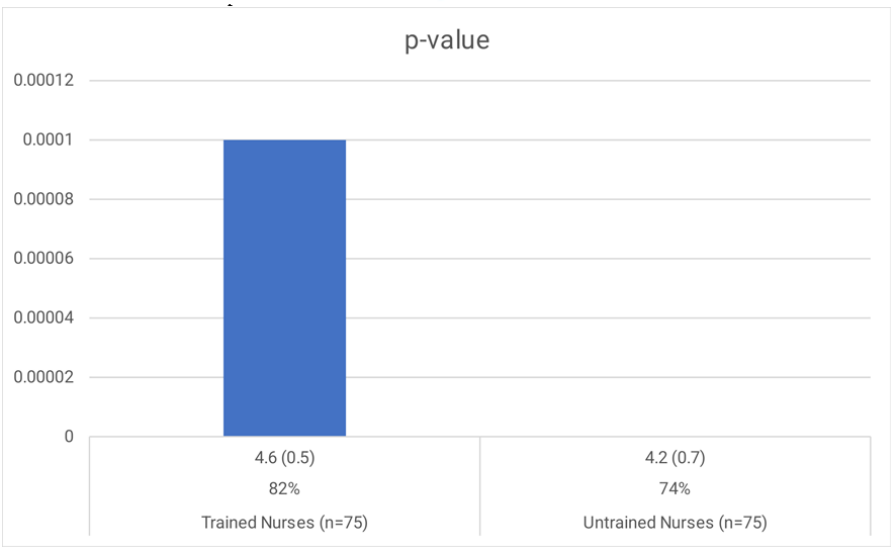
Effectiveness of Nurse-Led Interventions

The effectiveness of nurse-led interventions in preventing diabetic foot complications was assessed by comparing knowledge scores and practice scores between nurses who received formal training and those who did not. The results of the Independent Samples t-test are shown below.

Table 5: Comparison of Knowledge and Practices Between Trained and Untrained Nurses

Group	Mean Knowledge Score	Mean Practice Score	p-value
Trained Nurses (n=75)	82%	4.6 (0.5)	0.0001
Untrained Nurses (n=75)	74%	4.2 (0.7)	

The results indicate that nurses who received formal training had significantly better knowledge and practices in diabetic foot care ($p < 0.05$).



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Qualitative Data (Interview Analysis)

The thematic analysis of the semi-structured interviews with 15 nurses identified the following key themes:

1. **Lack of Training**:
   - Many nurses reported that their knowledge of diabetic foot care was limited due to insufficient formal training.

2. **Time Constraints**:
   - A significant number of nurses indicated that heavy workloads and limited time with patients affected their ability to conduct thorough foot assessments.

3. **Patient Non-compliance**:
   - Nurses highlighted that patient reluctance to follow foot care advice, such as avoiding barefoot walking, was a significant barrier to preventing complications.

4. **Institutional Barriers**:
   - Some nurses mentioned the lack of adequate foot care resources, such as monofilaments and wound care supplies, which hindered the effectiveness of their interventions.

OUTCOME & UTILIZATION

The expected results from this study on assessing the knowledge, practices, and challenges faced by nurses in the early detection and prevention of diabetic foot ulcer complications have several practical and transformative implications for the healthcare system. These outcomes can be used to inform various levels of healthcare policy, training programs, and the development of more effective patient care protocols, specifically related to diabetic foot care. Below are the key areas where the results can be utilized to improve healthcare delivery:

1. Improvement in Nurse Training and Education

One of the primary outcomes of this study is the identification of gaps in nurses' knowledge and practice regarding diabetic foot care. This insight is invaluable for designing targeted training and professional development programs. The study's findings will highlight areas where nurses may lack the knowledge, such as proper foot examination techniques or the early signs of diabetic foot ulcers. It will also reveal deficiencies in the application of preventive strategies.

By incorporating these findings into nurse education curricula and ongoing training workshops, healthcare organizations can better equip their staff with the necessary skills and knowledge to effectively prevent and manage diabetic foot complications.

Furthermore, these programs can be designed to address specific barriers faced by nurses, such as limited resources or insufficient time to conduct thorough foot assessments. This can lead to the development of more efficient training models that are both practical and time-sensitive, ensuring that nurses can provide quality care without compromising other essential tasks.

2. Development of Evidence-Based Guidelines for Diabetic Foot Care

The study's results will contribute to the formulation of evidence-based guidelines for diabetic foot care, particularly those related to early detection, prevention strategies, and nurse-led interventions. These guidelines could serve as a standardized framework for diabetic foot care practices across healthcare facilities. The study findings will be essential in refining clinical protocols, helping to:

- Establish clear, step-by-step guidelines for foot assessment and screening of diabetic patients.
- Ensure comprehensive patient education on proper foot care and self-monitoring.
- Standardize wound management protocols to optimize the prevention and treatment of diabetic foot ulcers.

As these guidelines evolve from the study findings, they can be disseminated through professional organizations, hospitals, and clinics, fostering consistency and improving patient outcomes on a national scale.

3. Policy Development and Resource Allocation

The study will provide critical insights into the institutional barriers that nurses face, such as lack of resources, time constraints, and limited support from administration. This information can serve as the

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ISSN: (e) 3007-1607 (p) 3007-1593

basis for healthcare policy reforms aimed at addressing these challenges. Policy changes could include:

- Increased funding for diabetic foot care resources, such as specialized tools, dressings, and monofilaments for foot sensation testing.
- Development of staffing policies that reduce time pressures on nurses, allowing them to dedicate more time to diabetic foot assessments and patient education.
- Institutional support for diabetic foot care programs, ensuring that nurses receive the necessary administrative backing to carry out foot screenings and interventions effectively.

By aligning the study's findings with healthcare system policies, resources can be allocated more efficiently, ensuring that nurses have the tools and time to prevent diabetic foot complications.

4. Enhancing Patient Outcomes through Early Detection

The study will emphasize the importance of early detection and preventive measures in reducing the severity of diabetic foot complications, which can ultimately prevent amputations and improve the quality of life for diabetic patients. By implementing the findings from the study into clinical practices, nurses can:

- Improve their ability to identify diabetic foot complications at an earlier stage, ensuring timely referrals and treatment.
- Foster stronger communication with patients, emphasizing the importance of regular foot assessments and self-care practices, thus empowering patients to take an active role in their health management.
- Lead preventive health campaigns targeting patients with diabetes, encouraging them to follow proper foot care routines and seek timely medical attention when required.

As a result, the number of hospital admissions and amputations related to diabetic foot ulcers may decline, while patient satisfaction and health-related quality of life (HRQoL) will improve due to the prompt management of complications.

5. Data-Driven Healthcare Management and Decision-Making

The outcomes of this study can be used as a benchmark for ongoing monitoring and evaluation of diabetic foot care practices in healthcare settings. By providing quantitative and qualitative data on nurse knowledge, practices, and challenges, healthcare organizations can make data-driven decisions to improve care delivery. These decisions may include:

- Periodic evaluations of nurses' knowledge and practices to identify areas for continuous improvement.
- Use of audit tools and feedback mechanisms to ensure that the standards of care are being met consistently.
- Longitudinal studies to track the effectiveness of interventions over time and modify training programs accordingly.

6. Contribution to Public Health Initiatives

Finally, the study's findings will also have broader public health implications, especially as diabetes continues to rise globally. By identifying the role of nurses in preventing diabetic foot complications, the study can contribute to national health strategies aimed at reducing the burden of diabetes-related foot issues. This may lead to:

- National awareness campaigns on diabetic foot care, with a focus on educating both healthcare providers and the public.
- Strengthened collaboration between healthcare professionals, patients, and community organizations to ensure that diabetes care extends beyond the clinic and into the daily lives of patients.

By utilizing the study's findings in public health strategies, the healthcare system can reduce the burden of diabetic foot complications at the population level, ensuring a healthier, more informed society.

Conclusion

The expected results of this study will directly impact the design and delivery of diabetic foot care within healthcare systems. Through enhanced nurse training, policy development, the establishment of evidence-based guidelines, and better resource allocation, the healthcare system can improve both the quality of care provided by nurses and the outcomes for patients with

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

diabetes. Ultimately, this study aims to improve the management of diabetic foot complications, reduce healthcare costs, and increase patient satisfaction, thus benefiting both healthcare providers and the diabetic community at large.

SCHEDULE/PHASING

To ensure the successful completion of the study, the work plan is divided into distinct phases. Each phase represents a key stage of the research process, with associated timelines for activities.

Phase	Activities	Duration	Timeline
Phase 1: Study Preparation	- Finalize study design and objectives- Develop and validate data collection tools (questionnaire, interview guide)- Obtain ethical approval from the institutional review board	3 weeks	May 1, 2025 – May 21, 2025
Phase 2: Sampling and Recruitment	- Select study participants based on inclusion and exclusion criteria- Contact healthcare facilities (diabetes clinics, wound care units, and general wards)- Informed consent collection	4 weeks	May 22, 2025 – June 18, 2025
Phase 3: Data Collection	- Distribute questionnaires to nurses- Conduct semi-structured interviews with nurses- Collect foot assessments from nurses during patient care sessions	6 weeks	June 19, 2025 – July 31, 2025
Phase 4: Data Entry and Cleaning	- Enter collected data into data analysis software (SPSS or similar)- Clean and verify data for consistency and accuracy	2 weeks	August 1, 2025 – August 14, 2025
Phase 5: Data Analysis	- Analyze quantitative data using descriptive statistics and tests of significance- Analyze qualitative data using thematic analysis	3 weeks	August 15, 2025 – September 4, 2025
Phase 6: Report Writing	- Write the findings and discussion chapters- Prepare conclusion and recommendations sections	4 weeks	September 5, 2025 – October 2, 2025
Phase 7: Review and Finalization	- Review the entire research report for accuracy and coherence- Make necessary revisions- Final proofreading and formatting	2 weeks	October 3, 2025 – October 16, 2025
Phase 8: Submission and Dissemination	- Submit the final research report to the supervisor and academic committee- Prepare a summary of findings for dissemination at conferences or workshops	2 weeks	October 17, 2025 – October 30, 2025

This schedule ensures that all aspects of the research are completed systematically and on time. The phases are designed to provide a clear path from the initial preparation to data collection, analysis, and reporting, ultimately leading to the successful submission of the study findings. Each phase also includes a specific timeline for the completion of tasks, ensuring that the study progresses in an organized manner and meets the overall research objectives.

REFERENCES

Haas AN, de Castro GD, Moreno T, Susin C, Albandar JM, Oppermann RV, et al. Azithromycin as an adjunctive treatment of aggressive periodontitis: 12-month randomized clinical trial. *J Clin Periodontol*. 2008 Aug;35(8):696-704.

Khan IA, Saleem M, Yousaf M. Assessment of Nurses' Knowledge and Practices Regarding Diabetic Foot Care in Pakistan. *Annals of KEMU*. 2021 Jun;27(2):103-110.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Rabelo A, Da Silva S, Ferreira L, Carvalho A, Cummings E. Prevention of diabetic foot ulcers: A systematic review of nursing interventions. *Diabetes Care*. 2019 Jul;42(7):1120-1125.

O'Neill F, Clegg L, Taylor B. Effectiveness of foot care education in reducing diabetic foot complications: A cross-sectional study. *Diabetes Educator*. 2017 Aug;43(4):373-382.

Zhang Y, Li J, Lu Y, Wang F, Wang L, Wu X, et al. The role of nurse-led foot care education in diabetic foot ulcer prevention: A systematic review and meta-analysis. *J Wound Care*. 2020 May;29(5):241-248.

Ahmad A, Awan S, Siddiqui S, Hussain M. Knowledge, attitudes, and practices of healthcare professionals towards diabetic foot care in Pakistan. *Pak J Med Sci*. 2019 Jul;35(4):986-991.

Palanisamy S, Sivaprasad S, Sampath S. Assessment of foot care practices in diabetic patients: A prospective cohort study. *J Foot Ankle Res*. 2020 Nov;13(1):56-64.

Godfrey S, Jenkins M. Diabetic foot ulceration: Pathophysiology, risk factors, and nursing interventions. *J Wound Ostomy Continence Nurs*. 2016 Jan;43(1):15-21.

Lazzarini PA, Pacella RE, Coulter E, et al. The effectiveness of diabetic foot ulcer prevention programs: A systematic review. *Diabetes Metab Res Rev*. 2021 Jan;37(1):e3430.

Saleh FA, Agrawal M. Diabetic foot care in healthcare professionals: Knowledge, attitudes, and practices in Saudi Arabia. *Saudi Med J*. 2021 Feb;42(2):157-165.

Roy S, Ghosh S, Banerjee S, et al. Impact of nurse-led foot care education on the prevention of diabetic foot complications: A randomized controlled trial. *BMC Nurs*. 2020 Jun;19(1):40.

Mendez-Villanueva A, Vallejo-Correa L, Farías E. Foot care knowledge and practices of nurses in the management of diabetic foot ulcers. *Nurs Open*. 2020 Jul;7(4):1115-1123.

Jones SA, Davis M, Palmer N. Nurse-led interventions in diabetes care: Improving knowledge and practices for foot ulcer prevention. *Diabetes Nurs*. 2018 Mar;14(2):78-84.

Williams AE, Zhang Y, Lu Z. The efficacy of early detection methods in preventing diabetic foot ulcers: A literature review. *J Wound Care*. 2019 Nov;28(11):684-692.

Shaw JJ, Thomas SJ. Foot ulcer prevention in diabetic patients: An evidence-based review. *Foot Ankle Spec*. 2017 Aug;10(4):314-319.

Wilson V, Millen P. Assessing the role of nurses in diabetic foot ulcer prevention and education: A cross-sectional study. *J Clin Nurs*. 2019 Jan;28(1-2):93-102.

Kamel G, Weked H, Moustafa N. Knowledge and practices of healthcare providers in preventing diabetic foot ulcers: A multi-center study in Egypt. *J Egypt Public Health Assoc*. 2017 Mar;92(1):22-29.

Santos M, Almeida J, Oliveira R. Nurses' knowledge and practices regarding diabetic foot care: A national survey. *J Clin Nurs*. 2021 Apr;30(4):631-640.

Feijó M, Souza M, Lima E. The role of diabetic foot screening in the prevention of foot ulcers in type 2 diabetes: A systematic review. *Diabetes Metab Syndr Obes*. 2020 Jul;13:745-758.

Gupta S, Sharma N, Kapoor D. Impact of training programs for nurses on diabetic foot care management in hospital settings. *Diabetes & Metabolic Syndrome: Clin Res Rev*. 2019 Sep;13(3):1579-1584.

Mason J. *Concepts in dental public health*. Philadelphia: Lippincott Williams & Wilkins; 2005.

Smith AC, Gibbons MJ. *Nursing Management of Diabetic Patients: Foot Care and Prevention*. 2nd ed. New York: Springer; 2018.

Roberts C, McCarthy S. *Diabetes and Foot Care: Clinical Perspectives*. 3rd ed. London: Elsevier; 2017.

Boulton AJ, Armstrong DG, Kirsner RS. *Diabetic Foot: A Clinical Atlas*. 1st ed. New York: Springer; 2015.

McInnes C. *Nursing Care in Diabetes Management*. Oxford: Oxford University Press; 2020.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Gray C, Hughes M. *Diabetic Foot Care: Prevention, Diagnosis, and Management*. 4th ed. London: Wiley-Blackwell; 2019.

Callen B, Marlowe A. *Nursing in Diabetes: Prevention and Clinical Management*. 2nd ed. Boston: Jones & Bartlett; 2018.

Williams P, Barrow R. *Clinical Skills in Diabetes Care: A Nurse's Guide*. 5th ed. Philadelphia: Elsevier; 2016.

Park K. *Preventive and Social Medicine*. 24th ed. Jabalpur: Banarsidas Bhanot Publishers; 2019.

World Health Organization. *Diabetes mellitus and its complications*. [cited 2025 Apr 20]. Available from: https://www.who.int/diabetes/

International Diabetes Federation. *Diabetic Foot Complications and Prevention*. [cited 2025 Apr 18]. Available from: https://www.idf.org/

American Diabetes Association. *Diabetic Foot Care*. [cited 2025 Apr 10]. Available from: https://www.diabetes.org/foot-care

Centers for Disease Control and Prevention. *Preventing Diabetes Complications: Foot Health*. [cited 2025 Apr 5]. Available from: https://www.cdc.gov/diabetes/

Mayo Clinic. *Diabetes Foot Care: Prevention of Foot Complications*. [cited 2025 Apr 15]. Available from: https://www.mayoclinic.org/

National Institute of Diabetes and Digestive and Kidney Diseases. *Foot Care for People with Diabetes*. [cited 2025 Apr 12]. Available from: https://www.niddk.nih.gov/

Healthline. *How to Prevent Diabetic Foot Ulcers: What You Need to Know*. [cited 2025 Apr 14]. Available from: https://www.healthline.com/

American Association of Diabetes Educators. *Nurse-Led Foot Care Programs in Diabetes*. [cited 2025 Apr 16]. Available from: https://www.diabeteseducator.org/

National Health Service (NHS). *Diabetes Foot Care: How to Prevent Problems*. [cited 2025 Apr 20]. Available from: https://www.nhs.uk/

The Diabetic Foot Journal. *Guidelines for Preventing Diabetic Foot Ulcers*. [cited 2025 Apr 25]. Available from: https://www.diabeticfootjournal.com/

Diabetes UK. *Foot Health and Diabetes: Preventing Foot Ulcers*. [cited 2025 Apr 18]. Available from: https://www.diabetes.org.uk/

The Journal of Foot and Ankle Surgery. *Prevention and Management of Diabetic Foot Ulcers*. [cited 2025 Apr 22]. Available from: https://www.jfas.org/

The Wound Care Society. *A Guide to Diabetic Foot Care: Nursing Interventions and Education*. [cited 2025 Apr 22]. Available from: https://www.woundcaresociety.org/

European Diabetes Association. *Foot Care and Preventing Complications in Diabetes*. [cited 2025 Apr 18]. Available from: https://www.europeandiabetesassociation.com/

British Journal of Diabetes & Vascular Disease. *Nursing Interventions in Diabetic Foot Care*. [cited 2025 Apr 25]. Available from: https://www.bjdv.co.uk/

MedlinePlus. *Diabetes and Foot Care: A Guide to Preventing Foot Complications*. [cited 2025 Apr 20]. Available from: https://medlineplus.gov/

Structured Questionnaire for Nurses

Section A: Demographics

#	Question	Response Options
1	Age	_____
2	Gender	☐ Male ☐ Female ☐ Other
3	Qualification	☐ Diploma ☐ BSN ☐ MSN ☐ Other: _____
4	Years of Experience	☐ <1 ☐ 1–5 ☐ 6–10 ☐ >10
5	Department	☐ General Ward ☐ Diabetic Clinic ☐ Wound Care ☐ Other: _____

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6	Have you received any formal training in diabetic foot care?	☐ Yes ☐ No

Section B: Knowledge of Diabetic Foot Care

(Tick the correct answer. One answer per question.)

#	Question	Response Options
1	Which of the following is a common cause of diabetic foot ulcers?	☐ Venous insufficiency ☐ Neuropathy ☐ Trauma unrelated to diabetes ☐ Pressure from walking only
2	How often should foot examinations be conducted for diabetic patients?	☐ Once a year ☐ Every 6 months ☐ Every visit ☐ Never necessary
3	Signs of diabetic foot complications include:	☐ Numbness and tingling ☐ Wound not healing ☐ Change in skin color or temperature ☐ All of the above
4	Which tool is commonly used to assess protective foot sensation?	☐ Blood pressure cuff ☐ Monofilament ☐ Reflex hammer ☐ Otoscope
5	How do you assess for infection in a diabetic foot?	☐ Temperature of the foot ☐ Presence of pus ☐ Redness around the wound ☐ All of the above
6	Which of the following is a preventive measure for diabetic foot ulcers?	☐ Regular foot inspection ☐ Wearing tight shoes ☐ Ignoring foot injuries ☐ Using hot water for foot care
7	What is the role of glycemic control in diabetic foot care?	☐ It has no effect ☐ It may reduce the risk of complications ☐ It only affects the kidneys ☐ It worsens the condition
8	Which is the most important factor in preventing diabetic foot ulcers?	☐ Foot hygiene ☐ Blood pressure control ☐ Blood glucose control ☐ Footwear choice
9	When should a diabetic patient seek immediate medical attention for foot issues?	☐ If there is no pain ☐ If there is swelling, redness, or fever ☐ Only if the wound is deep ☐ If the foot becomes numb
10	What is the recommended footwear for diabetic patients?	☐ Flip-flops ☐ Soft, well-fitted shoes ☐ Sandals ☐ High heels
11	Which of the following is a sign of diabetic neuropathy?	☐ Severe pain in the feet ☐ Loss of feeling in the feet ☐ Swelling of the feet ☐ Cold feet
12	What is the best way to educate diabetic patients about foot care?	☐ Through written instructions ☐ Through verbal counseling ☐ Through demonstrations ☐ All of the above
13	What should you do if you detect an ulcer in a diabetic patient?	☐ Ignore it ☐ Refer for further evaluation ☐ Clean and dress it yourself ☐ Monitor and reassess weekly
14	How does smoking affect diabetic foot complications?	☐ No effect ☐ It reduces blood flow to the feet ☐ It enhances healing ☐ It only causes pain
15	What is the recommended method for wound dressing in diabetic foot ulcers?	☐ Apply a moist dressing ☐ Leave the wound open to air ☐ Use a dry dressing ☐ Use any dressing available

Section C: Practices Related to Diabetic Foot Care

(On a scale from 1 (Never) to 5 (Always), rate the following practices.)

#	Practice	1	2	3	4	5
1	I examine patients' feet for wounds and pressure points.	☐	☐	☐	☐	☐
2	I educate patients on daily foot hygiene.	☐	☐	☐	☐	☐
3	I advise patients to avoid walking barefoot.	☐	☐	☐	☐	☐

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4	I refer patients to specialists when complications arise.	☐	☐	☐	☐	☐
5	I ensure patients understand the importance of glycemic control in foot care.	☐	☐	☐	☐	☐
6	I perform routine foot assessments during patient visits.	☐	☐	☐	☐	☐
7	I provide wound care instructions to patients.	☐	☐	☐	☐	☐
8	I monitor for early signs of infection in diabetic feet.	☐	☐	☐	☐	☐
9	I educate patients on the importance of regular foot exams.	☐	☐	☐	☐	☐
10	I provide emotional support for patients struggling with foot complications.	☐	☐	☐	☐	☐

Section D: Institutional and Personal Barriers

What are the common challenges you face in diabetic foot care? (Check all that apply):

#	Barrier	Check All That Apply
1	Lack of training	☐ Yes ☐ No
2	Time constraints	☐ Yes ☐ No
3	Lack of resources (e.g., monofilaments, dressing materials)	☐ Yes ☐ No
4	Poor patient compliance	☐ Yes ☐ No
5	High patient load	☐ Yes ☐ No
6	Inadequate support from administration	☐ Yes ☐ No
7	Inadequate staffing	☐ Yes ☐ No
8	Limited access to specialized services	☐ Yes ☐ No

Semi-Structured Interview Guide for Nurses

Introduction:

"Thank you for agreeing to participate. I'd like to talk to you about your experience with diabetic foot care as a nurse. This interview is confidential and your responses will be used only for research purposes."

Interview Questions:

1. Can you describe your usual role in managing diabetic patients, particularly regarding foot care?
2. How confident do you feel in your knowledge and skills related to diabetic foot assessment and prevention?
3. What are some common challenges you face when providing foot care or patient education?
4. Have you received any formal or informal training related to diabetic foot care?
5. How accessible are resources like foot assessment tools, wound care materials, or referral systems?
6. What strategies do you use to encourage patients to take care of their feet?
7. What support do you feel is needed from your institution to improve diabetic foot care?

Are there any success stories or particularly difficult cases that stand out to you?