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Original Research Article

# Impact of Collaborative Clinical Pharmacist-Nurse Practice Intervention on Medication Safety and Wound Healing Outcomes in Diabetic Foot Patients

**Mohannad Abdulsahib Zaboon Al-Saadi**
*College of Pharmacy, Al-Nahrain University, Iraq*

**Abstract:** Diabetes mellitus regarded as the most common widespread disorders of metabolics for the 21st century, frequently leads to a severe longterms secondary complications. decreasing the recurrences of that complications disorders, especialy diabetic foot ulcer, demands meticulous treatment and proactive monitoring by the healthcare practitioners. Nursing staffs, in particular have an important role in providing essential information, clinical monitoring, and health-state treatment advices needed to stabilize and preserve patient health

Objectives

This study was aimed to be assess the quality of cares and levels of practitioner knowledge regarding diabetic foot ulcers regarding a samples of nurses professionals practicing through various hospitals in Baghdad.

Methods and Results

the total of 200 professional nursing staffs participated in this cross-sectional study. This study included 88 males participants (44%) and 112 females participants (56%) with an mean age equal to 34.74 ± 12.167 years. In term of medical staffs educational qualifications, 64 nurses (32%) has a Bachelor's degree 92 (46%) possessed a technicals diploma degree, and 44 (22%) had completed high school nursing programs. So The overall study give a mean score equal to 38 ± 6.37 out of a maximum 47 that done the corrected answers. Across the four structural questionnaire sub-tables the participants played a robust understanding the diabetic foot risk factors, diagnostic steps for examination, secondary complicating disorders, and the selection for appropriate therapeutic foot care devices.

Conclusion and Recommendations

our study regarded the surveyed nursing staffs possess a thoroughly satisfactory baseline knowledge contributing to the risk factors, secondary complication, and medical devices usedin diabetic foot care, irrespective to the gender. However, the level of experting were significantly affected by the nurses' formal educational attainment, with Bachelor's degree have achieving the maximum performance scores. Conversely, advanced age did not positively related with professional knowledge, exerting a negative impact on the overall assessment scores. The primary limitations identified include a localized sample size, a constrained set of evaluations questions, and a relative scarcity for comparable domestic research on this topic.

***Keywords:*** *Diabetic Foot, Diabetes Mellitus, Foot Care, Diabetic Foot Ulcer, Wound Healing, Medication Safety, Clinical Nursing*

## 1. Introduction

### 1.1 Definition

Diabetes mellitus have as a diagnostic wide terms for a numbers of metabolic disorders characterized by compromised glucose tolerances that leads to chronic increase in glucose levels. It remains one of the most prevalent disorders for chronic conditions that affecting about 5% to 10% of the adult population through the Western world. The worldwide incidence of diabetes is increasing rapidly; projections indicate that its has global prevalence that experience an increase by 50% between the years 2000 and 20309 (International Diabetes Federation, 2021).

### 1.2 Epidemiology

Epidemiological data show that a substantial levels of adults aged 18 and older are living with diabetes, making it a direct cause about millions of deaths worldwide, with a high number of these fatalities occurring in individuals less than the age of 70. Furthermore diabetes directly accounts for hundreds of thousands of deaths stemming from end-stage kidney disease, while chronic elevations in blood glucose levels contribute to approximately 20% of all cardiovascular mortalities (GBD 2021 Diabetes Collaborators, 2023).

The disorder can be classified into two primary clinical categories:

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Corresponding Author: Mohannad Abdulsahib Zaboon Al-Saadi

**Type 1 Diabetes:** that referred to as insulin-dependent, juvenile or childhood-onset diabetes, this form have an absolute decreases in endogenous insulin synthesis, necessitating mandatory lifelong insulin administration every day.

**Type 2 Diabetes:** Representing the majority of cases of diabetes this condition develops when blood glucose levels increase excessively because the body cannot effectively produce or utilize insulin. Blood glucose levels acts as the essential cellular energy source and is come predominantly from dietary intake .

The classic clinical presentation of uncontrolled diabetes includes: weight loss, polyuria (excessive urination), polydipsia (excessive thirst), and polyphagia (excessive hunger). These symptoms frequently noticed rapidly du wring weeks or months in type 1 diabetes, (Emerging Risk Factors Collaboration, 2023 or recent updates) whereas they typically demonstrated at a much slower rate and may be remain subtle or absent in individuals with type 2 diabetes.

A variety of other signs and symptoms could be accompanied by the onset of diabetes, though they are not exclusively specific to this metabolic disorders (Diabetes Prevention Program Research Group, 2022). These include blurred vision, generalized headaches chronic fatigue delayed wound healing of minor cuts, and pruritus (itchy skin) (DiMeglio et al., 2024). Persistent increase in glucose level forces glucose absorption into the crystalline lens of the eye lead to structural shape changes that alter refractory properties and induced vision fluctuations (World Health Organization, 2024/2025). Over long periods irreversible loss of vission can manifest due to the progression of diabetic retinopathy. Additionally, the spectrum of dermatological disorders conditions and skin rashes that emerge alongside to the disease can be categorized by the term diabetic dermadromes (American Diabetes Association Professional Practice Committee for Diabetes, 2026).

### 1.3 Risk Factors

Key clinical and demographic risk factors that could cause the individuals for progression of diabetes include:

45 years of age.

Being overweight or obese, defined as a Body Mass Index (BMI) equal to 25 kg/m^2 (or 23 kg/m^2 particularly tailored for Asian American populations) (Hsu et al., 2015), or an increased the waist circumference exceeding 40 inches or (102 cm) for men and 35 inches or (88 cm) for female (Ross et al., 2020).
Belonging to a highly-risk ethnic demographical (e.g., African American: Hispanic/Latino American Indian or Alaska Native Asian American or Pacific Islander).

A writing of history of diabetes in family in a first-degree relative (e.g., parent or sibling).

A clinical complications of gestation diabetic mellitus (GDM) or delivering an infant weighing over 9 lbs.

Habitual physical inactivity.

Chronic elevation in blood presure ( 140/90 mmHg) or undergoing active antihypertensive pharmacological management.

High-Density Lipoprotein (HDL) cholesterol levels less than 35 mg/dL (0.90 mmol/L).
Fasting serum triglyceride (TG) levels more than 250 mg/dL (2.82 mmol/L).
Co-morbidities linked to chronic insulin resistance (such as acanthosis nigrican and nonalcoholic steatohematitis, or polycystic ovarian syndroms). Pre-existing atherosclerosis cardiovascular disease. Active long-term pharmacological treatment utilization of atypical antipsychotics or systemic glucocorticoids.

### 1.4. **Diabetes Complications**

Current studies suggest that about half of all individuals living with diabetes remaining undiagnosed and unaware for their metabolic status, making them highly susceptible to producing advanced secondary pathologies (International Diabetes Federation, 2015). The complication chronicaly disorders of diabetes are broadly categorized into microvascular and macrovascular damage to microvascular abnormalities exhibiting a significantly higher clinical prevalence (Deshpande et al., 2008)

**Microvascular Complications:** Include peripheral neuropathy, diabetic nephropathy, and diabetic retinopathy.

**Macrovascular Complications:** Encompass coronary artery diseases, cerebrovascular accidents (stroke), and peripherally artery diseases (PAD).

Diabetic foot syndromes is clinically defined as the co-occurrence of foot ulceration alongside peripheral neuropathy, PAD and localized infection; it serves as a leading underlying cause of non-traumatic lower extremity amputations. Finally miscellaneous complications that fall outside these two vascular categories include advanced periodontal disease, compromised immune resistance against pathogens and severe obstetric complications among women diagnosed with gestational diabetes (Tuttolomondo et al., 2015).

### 1.5 Diabetic Foot

Pathological foot conditions afflict roughly 6% of all patients diagnosed with diabetes and manifest as localized infections, deep ulcerations, or the progressive destruction of deep foot tissues (Zhang et al., 2017). These manifestations substantially degrade a patients overall quality of life while severely restricting socially participation and economic livelihood (Schaper et al., 2003). Between 0.03% and 1.5% of individuals presenting with diabetic foot complications eventually require some level of lowerlimb amputation (Jeffcoate &

Bakker, 2005). Fortunately the vast majority of amputations begin as preventable superficial ulcers and can be averted through structured patient self-care routines and clinical screenings designed to map out foot complication risks (Lazzarini et al., 2015; Singh et al., 2005).

### 1.6 Etiology

Chronic, poorly managed hyperglycemia accelerates the onset of peripheral neuropathy and peripheral arterial disease via a series of intricate metabolic and biochemical pathways (Bhat et al., 2017). The loss of protective sensation driven by peripheral neuropathy, coupled with localized peripheral ischemia secondary to peripheral arterial disease functions independently or synergistically to provoke foot ulceration (Lazzarini et al., 2015). Systematic review data indicate a high worldwide prevalence for diabetes-associated peripheral neuropathy and peripheral arterial disease.

Diabetes also acts as the primary driver behind Charcot arthropathy, an inflammatory condition characterized by the progressive non-infectious destruction of bones and joints, and surrounding softs tissue, most frequently concentrated in the foot and ankle regions (Frykberg & Belczyk, 2008). The reported clinical incidence of diabetes-related Charcot arthropathy ranges between among specific populations, though there is a noted decrease of high-quality, large-scale epidemiological investigations regarding Charcot foot conditions.

Mechanistically a combination of sensory neuropathy, abnormal biomechanical loading across the plantar surface, repetitive unrecognized micro-trauma, and localized metabolic bone imbalances triggers an inflammatory cascade. This lead to progressive osteolysis, stress fractures, joint dislocation, and permanent structural disorders. In low- and middle-income nations, specific socio-environmental factors exacerbate the global burden of diabetic foot disease. These factors include habitual barefoot walking, inadequate patient education delayed medical consultations, and a severe shortage of specialized foot care infrastructure or trained healthcare professionals (Rogers et al., 2016).

### 1.7 Prevention

#### 1.7.1 Regular Foot Examination

Frequent structured followup assesment are highly recommended for patients with moderates or highly risks, such as those patients presenting with visible structural foot deformities or those previously diagnosed with peripheral neuropathy or peripheral arterial disease during initial clinical screenings. Repeated of diagnostic testing for sensory neuropathy is unnecessary if the deficits has been objectively established as the clinical studies has yet to identify a reliable methods for reversing diabetic neuropathy. Instead of a rapid visual inspection for detection of early disruptions in the skin integrity or minor ulcerations is sufficient. Patients with asymptomatics peripherally arterial diseases could be successfully managed by primary care settings according to established vascular guidelines(National Institute for Health and Care Excellence, 2012).

#### 1.7.2 Glycemic Control

Early intensive and sustained blood glucose control has proven efficient in preventing the initial onset of neuropathy though the clinical literature lacks of definitive evidence showing that tight blood sugar control can reverse established nerve damage(Ang et al., 2014). Healthcare providers should thoroughly be discuss personalized optimal blood glucose and glycated hemoglobin (HbA_{1c}) targets with each patient. Continuous monitoring must be carried out in adherence to standardized diabetic care guidelines to effectively delay or slow down the progression of peripheral nerve damage (Pop-Busui et al., 2017).

#### 1.7.3 Footwear

The regular use of occlusive footwear traps moistures and promotes of localized sweating, which could be predispose diabetic patients to severe superficial fungal infections, particularly in tropical climates that's lead to Ideally therapeutic footwear designed for diabetic individuals should feature a wide toe box to prevent friction, softs cushionad soles, extra depth to easily accommodate custom orthotics if required, and secure lace or Velcro closures to allow for precise adjustments(Thomas et al., 2010). To prevent blister formation new shoes should be worn for brief, incremental periods daily until fully broken in. Patient adherence to prescribed orthopedic footwear is historically low particularly those when individuals are inside their own homes where they remains essentially active but often prefered to walk without shoes(Selva Olid et al., 2015).

### 1.8 Treatment

#### 1.8.1 Pharmacological Treatment

awaiting definitive microbiological culture yields and auxiliary diagnostic data clinicians must promptly initiate empirical antibiotic therapy for suspected diabetic foot infections (DFIs). The use of the initial drug regimen must be closely tailored to the clinical features the severity of the infection, clues pointing toward specific pathogens, recent histories of antimicrobial exposure, and localized antibiotic resistance patterns. In Western nations, the most prevalent pathogens isolated from DFIs are aerobic Gram-positive cocci, prominently Staphylococcus aureus(Selva Olid et al., 2015).

For mild non-severe infections in patients lacking specific risk factors for Gram-negative organisms (such as recent hospitalizations or prior broad-spectrum antibiotic therapy) or obligate anaerobes (associated with severe ischemia or gangrene), narrow-spectrum, anti-staphylococcal targeted therapies are sufficient. Conversely, for severe or limb-threatening infections, it

is much safer to initiate broad-spectrum empirical regimens(Dumville et al., 2017).

Although localized topical antimicrobial therapies may be appropriate for highly superficial, minor infections the vast of majority of DFIs necessitate systemic antibiotic administration. For severe infections, an initial course of parenteral therapy lasting a few days is typically ideal; patients can then transition to oral agents characterized by high bioavailability once stabilized.

Clinicians must review the empirical regimen within a few days and adjust it based on the patient's clinical response and emerging culture sensitivity profiles Definitive antibiotic choices should always align with the core principle for antimicrobially stewardship: utilizing the narrowest spectrum possible for the shortest effective clinical duration(Lipsky et al., 2016). Its is crucially to remembers the antibiotics therapy is indicate solely for eradicated actives infections; it does not accelerate wounds healing or prevent future contaminations.

Mild soft tissues infections are routinely manage with oral agent ex. dicloxacillin cephalexin or clindamycin. while, severe deep soft tissue infections require initial intravenous administration of combinations such as ciprofloxacin plus clindamycin, piperacillin/tazobactam, or imipenem/cilastatin. The locally prevalence of methicillin resistant *S. aureus* (MRSA) must always can be considered, were choosing an empirically regimens. The total durations of antibiotics administrations typically spans 1 to 4 weeks with uncomplicated soft tissue infection, whereas it extends from 6 - 12 weeks for confirmed osteomyelitis, always guided by culture-directed modifications(Boulton et al., 2005).

### 1.8.2 Non-Pharmacological Treatment

Surgically intervention serve as the absolutely cornerstones of treatment for deep or complicate diabetics foot infections(Tan et al., 1996). The require processes that range from simple incisions and drainage to aggressives serially surgically debridement or major amputations Emergents surgical intervention is absolutely mandatory in cases of severe infection occurring in ischemic limbs necrotizing fasciitis gas gangrenes or infections complicated with acute compartment syndrome(Pittet et al., 1999). Once the infectious process were controlled and the wounds bed begins to exhibit healthy granulation tissue primary surgical closure may be attempted(Armstrong & Lavery, 2005). Alternatively wounds can be managed by surgically flaps or grafts left open to heal through secondary intention or optimized using negative pressure wound therapy (NPWT) dressings.

If an infecte lowers extremity have sign of severe ischemia, the patients should be referred immediately to a vascular surgeons. While non critical ischemia could be occasionally be managed conservatively without urgents vascular intervention early revascularization procedures executed within a fews days of infections onset are mandatory to successfully preserves an infected foot complicated by critical limb ischemia(Faglia et al., 2006).

### 1.9 Aim of the Study

This study were aimed to asses the quality of nursing staffs care produced to diabetic foot patients and to gauge the depth of clinical awareness, and knowledges among nursings staff regarding the specific medical requirements of this patient population.

## 2. Methods and Subjects

### 2.1 Sample and Setting

This descriptive of cross sectional studies were conducted through various hospitals in Baghdad and supplemented by targeting certified professionally nursing networks on social media platforms. A random sampling techniques were utilized to recruitment participants. The physical hospital based samples comprised 120 practicing nurses who voluntarily consented to participate between January and February 2024. These participants were given self-administered questionnaire forms by the researchers were approximately 15 to 20 minutes to complete. The completed hardcopy forms were gathered directly by the investigator. To broaden the sample an additional 80 electronics questionnaires was successful retrieved from verified, professionals nursing groups hosted to social media platforms leads to in an overall study cohort of 200 nurses.

### 2.2 **Instruments**

Data were collections was executed using a multi parts instrument titled *"Assessment of knowledges and attitudes of nursing staffs caring for foot patients in Iraqi hospitals."* The instrument was broken down into, five primary analytical sub sections:

1. Nurse Demographic Information.

2. Nursing Staff Knowledge of Factors risk for Diabetic Foot.

3. Knowledge of the Nursing Staff in Examining the Diabetic Foot.

4. Knowledge of Nursing Staff About Diabetic Foot Complications.

5. Nursing Staff's Knowledge for the Choice of Foot Devices for Diabetic Foot.

The complete composite assessment tool comprised a total of 47 closed-ended questions.

### 2.3 **Participant Selection**

* **Inclusion Criteria:** Actively practicing professional nurses for any age and gender currently employed within an operational hospital setting.

* **Exclusion Criteria:** No specific exclusion criteria were applied.

### 2.4 Data Collection Layout

The following structural tables represent the operational layout of the questionnaire items administered to the participants:

**Table 2.1: Nursing staff knowledge of factors risk for diabetic foot**

| Questions | yes | no | I don't know |
|---|---|---|---|
| Poor blood sugar control | | | |
| There is a sensation of cold, pain, burning and tingling | | | |
| Neuropathy (loss of sensorimotor function. | | | |
| Peripheral vasculars diseases | | | |
| Inadequate foot care and lack of the hygiene | | | |
| The presences of the foot edema | | | |
| Presence of corn | | | |
| Dried and cracked feet skins | | | |
| Those with the histories of diabetics foot or diabetic ulcers on the other side | | | |
| Infections (redness, tenderness, and high temperature are present in foot) | | | |
| Trauma (walking barefoot, bad shoes, accidents and forging objects in the shoes) | | | |
| deformity of foot ) hammer toes, claws toe, claw toes, hallux valgus, amputation, charcot deformity, foot low and etc.) | | | |
| Smocking | | | |
| Obesities | | | |
| 65 of age and over | | | |

**Table 2.2: Knowledge of nursing staff in diabetic foot examination**

| Questions | Yes | No | I don't know |
|---|---|---|---|
| The colors are controlled (pale, blue, red) | | | |
| Temperature and coldness is controlled | | | |
| The skin of the foot (discoloration, atrophy, edema , scabs, cracking, callus, exostosis, etc.) is assessed | | | |
| The presences of the neuropathies in the foot (pain, tingling , burning, tenderness, and sensory loss) is evaluated . | | | |
| Muscles functions (atrophy caused by motor damage in the muscles) is assessed. | | | |

| | | | |
|---|---|---|---|
| Circulation is controlled (pale feet and cyanosis) | | | |
| The presences of ulcers in the foot (high temperature in the foots, rednes, edema, and tenderness) is assessed | | | |
| The presences of the deformity (hammer toe, claw hallux valgus amputation, Charcot deformity, low foot, etc.) is assessed. | | | |
| The nails of the foot are controlled (thickness of the nails and the length of the nails) | | | |
| The fit of the shoes is evaluated | | | |

**Table 2.3: Knowledge of nursing staff about diabetic foot complications and care**

| Questions | Yes | No | I don't know |
|---|---|---|---|
| The feet should be examined everyday by the patients or by eye hand and mirrors(presence of callus, crack, redness, bubble, open wound and etc.) | | | |
| Feet should be wash with warm water everyday | | | |
| The temperature of the water used for washing the feet should be checked | | | |
| The feet, especially the spaces between the toesshould be , dried thoroughly after each wash | | | |
| A moisturizings creams should be applied to the feet | | | |
| A moisturizing cream should be applied to the spaces between the toes | | | |
| Toes should be kept dry to prevent fungal growth | | | |
| Cutting tools and chemicals should not be used to remove calluses or hardened areas of skin | | | |
| Exercise in the form of twisting and stretching the toes should be done several times a day to prevent corns and callus formation | | | |
| Directs heat source (radiators, hot water bottle, electrical appliances, etc.) should be used to warm the feet | | | |
| Socks should be changed every day | | | |
| Barefoot walking should not occur | | | |
| Pressure should be removed from the feet by not standing for long periods | | | |
| Foot exercises should be done every day to help blood circulation | | | |

**Table 2.4: Nursing staff's knowledge of the choice of foot devices for diabetic foot**

| Questions | Yes | No | I don't know |
|---|---|---|---|
| Shoe shoulds fit and grip the feet | | | |

| | | | |
|---|---|---|---|
| Soft and comfortable shoes should be preferred | | | |
| Shoes should be checked for foreign bodies such as nails, pebbles, etc. before each wear | | | |
| Shoes must be worn without socks | | | |
| Shoes must not lose their external protection feature | | | |
| New shoe should be worn by allowing the feet to get used to them | | | |
| It is preferable to wear high-heeled shoes that bend forward | | | |
| If there is a deformities in the foot, a doctor should be consulted for treatment | | | |

### 2.5 Statistical Analysis

Data management and statistical computations was done by utilizing SPSS software (Version 23.0; IBM Corp, Armonk, NY). Tabulated frequency data was subjected to Chisquare analysis with statistical significance established at a Pvalue < 0.03. Pearson correlation coefficients (r) were computed to analyze continuous relationships between specific baseline parameters and overall scores. Descriptive statistics—including percentages, raw frequencies, arithmetic means ranges and standard deviations (SD) containing minimum-maximum values—were generated to present clinical characteristics and questionnaire outcomes.

## 3. Results

### Demographic Characteristics of Participants

The study participants of 200 nursing professional, with gender contributing equal to 88 males (44.0%) and 112 females (56.0%). The means age for the sample taken were 34.74 ± 12.167 years. Regarding formally educationals background, 64 participants with (32.0%) held a Bachelor's degree, 92 (46.0%) possessed a professional Diploma and 44 (22.0%) have a high schools nursing educations. The overall mean score for correctly answered items across the questionnaire was 38 ± 6.37 out of a maximum possible score of 47.

**Table 3.1: Demographic characteristics of participants**

| Index | | Frequency N=50 |
|---|---|---|
| Genders (No. and %) | Male | 88 (44.0%) |
| | Female | 112 (56.0%) |
| age mean ±SD (years) | | 34.74 ± 12.167 |
| educational level | Bachelor | 64 (32.0%) |
| | Diploma | 92 (46.0%) |
| | Highschool | 44 (22.0%) |
| Scores of Questions answered correct Mean + SD (out of 47) | | 38 ± 6.37 |

The surveyed nurses staffs exhibited a high level of corrected baseline knowledge regarding diabetic foot risk factors (Table 3-2). The majority of respondents selected the correct options across all items with accuracy rates ranging from a minimum of 74.0% for Question 2 to a maximum of 94.0% for Questions 8 and 11.

Analysis of specific items revealed that for Question 2, 22.0% answered incorrectly and 4.0% were completely unaware that neuropathic sensations (cold, pain, burning, tingling) represent primary risk factors. For Question 7, 16.0% answered incorrectly and 8.0% failed to recognize corn development as a predisposing hazard. For Question 15, 24.0% gave an incorrect answer regarding advanced age.

**Table 3.2: Nursing staff knowledge for risk factors of diabetic foot**

| Questions | I don't know | No | Yes | Correct answer |
|---|---|---|---|---|
| 1-Poor blood sugars control | 2.0% | 10.0% | **88.0%** | Yes |
| 2-There are  a sensations of cold, pain, burning and tingling | 4.0% | 22.0% | **74.0%** | Yes |
| 3-Neuropathy (loss of sensorimotor function) | 10.0% | 10.0% | **80.0%** | Yes |
| 4-Peripherally vascular diseases | 16.0% | 8.0% | **76.0%** | Yes |
| 5-Inadequate foot cares and lack of hygiene | 0% | 10.0% | **90.0%** | Yes |
| 6-The presence of foot edema | 4.0% | 10.0% | **86.0%** | Yes |
| 7-Presence of corns | 8.0% | 16.0% | **76.0%** | Yes |
| 8-Dry and cracked feet skin | 0% | 6.0% | **94.0%** | Yes |
| 9-These with histories of diabetic foot or diabetic ulcers on the other side | 2.0% | 10.0% | **88.0%** | Yes |
| 10-Infections (redness, tenderness and high temperature present in the foot) | 6.0% | 12.0% | **82.0%** | Yes |
| 11-Trauma (walking barefoot, bad shoes, accidents and foreign objects in the shoes) | 0% | 6.0% | **94.0%** | Yes |
| 12-Foot deformities (hammer toe, claw toes, hallux valgus, amputation, charcot deformity, foot low and etc.) | 6.0% | 12.0% | **82.0%** | Yes |
| 13-Smoking | 4.0% | 16.0% | **80.0%** | Yes |
| 14-Obesity | 0% | 16.0% | **84.0%** | Yes |
| 15-Age 65 and over | 0% | 24.0% | **76.0%** | Yes |

Regarding the diagnostics examinations (Table 3-3), the nursing staffs were demonstrated sufficient overall knowledge. The lower correct responses rate were equal to 70.0% for Question 20, while the maximum accuracy rate reached 94.0% for Question 25.

For the Question 18, 22.0% of participents answered incorrectly and 6.0% was unawares for that evaluating skins changes (discoloration, atrophy, edemas, cracking) are critical. For the Question 20, 22.0% failed to correctly identifing the importances for evaluating intrinsic muscles function and motor driven atrophy, while 8.0% was remained completely unawares for this examination parameter.

**Table 3.3: Knowledge of nursing staff in diabetic foot examination**

| Questions | I don't know | No | Yes | Correct answer |
|---|---|---|---|---|
| 16-The color is controlled (pale, blue, red) | 4.0% | 8.0% | **88.0%** | Yes |
| 17-Temperature and coldness are controlled | 10.0% | 18.0% | **72.0%** | Yes |
| 18-The skin of the foot (discoloration, atrophy, edema, scabs, cracking, callus, exostosis and etc.) is assessed | 6.0% | 22.0% | **72.0%** | Yes |
| 19-The presence of neuropathies in the foot (pain, tingling, burning, tenderness and sensory loss) is evaluated | 8.0% | 6.0% | **86.0%** | Yes |
| 20-Muscle function (atrophy caused by motor damage in the muscles) is assessed | 8.0% | 22.0% | **70.0%** | Yes |
| 21-Circulation is controlled (pale feet and cyanosis) | 4.0% | 10.0% | **86.0%** | Yes |
| 22-The presences of ulcer on the foot (high temperature in the foot, redness, edema and tenderness) is assessed | 0% | 10.0% | **90.0%** | Yes |
| 23-The presence of deformity (hammer toe, claw toes, hallux valgus, amputation, charcot deformity, low foot, etc.) is assessed | 10.0% | 6.0% | **84.0%** | Yes |
| 24-The nails for the foot is controlled (thickness of the nail and the length of the nails) | 4.0% | 12.0% | **84.0%** | Yes |
| 25-The fit of the shoe is evaluated | 2.0% | 4.0% | **94.0%** | Yes |

**Table 3.4: Knowledge of nursing staff about diabetic foot complications and care**

| Questions | I don't know | No | Yes | Correct answer |
|---|---|---|---|---|
| 26-The feet should be examined everyday by the patients or by eye, hand and mirrors. (presence of callus, crack, redness, bubble, open wound and etc.) | 0% | 0% | **100.0 %** | Yes |
| 27-Feet should be washed with warm water everyday | 4.0% | 12.0% | **84.0%** | Yes |
| 28-The temperature of the water used for washing the feet should be checked | 6.0% | 12.0% | **82.0%** | Yes |
| 29-The feet, especially the spaces between the toes, should be dried thoroughly after each wash | 0% | 8.0% | **92.0%** | Yes |
| 30-A moisturizing creams could be applie to the feet | 4.0% | 10.0% | **86.0%** | Yes |
| 31-A moisturizings creams can be applied to the spaces between the toes | 6.0% | 12.0% | **82.0%** | Yes |
| 32-Toes can be kept dry to prevent fungal growth | 6.0% | 8.0% | **86.0%** | Yes |
| 33-Cutting tools and chemicals can not be used to removes calluses or hardened areas of skin | 6.0% | 8.0% | **86.0%** | No |
| 34-Exercises in the form of twisting and stretching of | 12.0% | 8.0% | **80.0%** | Yes |

| | | | | |
|---|---|---|---|---|
| the toes should be done several times a day to prevent corns and callus formation | | | | |
| 35-Directs heat source (radiators, hot water bottle, electrical appliance and etc.) should be used to warm the feet | 10.0% | 12.0% | **78.0%** | Yes |
| 36-Socks should be changed everyday | 2.0% | 8.0% | **90.0%** | Yes |
| 37-Barefoot walking should not occur | 0% | 8.0% | **92.0%** | Yes |
| 38-Pressure should be removed from the feet by not standing for long periods | 0% | 8.0% | **92.0%** | Yes |
| 39-Foot exercises should be done everyday to help blood circulation | 0% | 6.0% | **94.0%** | Yes |

Regarding the selection of medical and protective footwear devices (Table 3-5), the participants demonstrated good overall knowledge. Accuracy peaked at 94.0% for Questions 41, 42, and 47. However, severe knowledge deficits were uncovered in Question 46, which recorded the lowest accuracy score of 36.0%; here, 52.0% of respondents incorrectly believed that wearing high-heeled shoes that bend forward is a preferable choice for diabetic patients.

**Table 3.5: Nursing staff's knowledge of the choice of devices for diabetic foot**

| Question | I don't know | No | Yes | Correct answer |
|---|---|---|---|---|
| 40-Shoes should be fit and grip the feet | 2.0% | 10.0% | **88.0%** | Yes |
| 41-Soft and comfortable shoes should be preferred | 2.0% | 4.0% | **94.0%** | Yes |
| 42-Shoe shoulds be checked for foreign bodies such as nails, pebbles, etc. before each wear | 2.0% | 4.0% | **94.0%** | Yes |
| 43-Shoes must be worn without socks | 6.0% | **50.0%** | 44.0% | No |
| 44-Shoes must not lose their external protection feature | 6.0% | 2.0% | **92.0%** | Yes |
| 45-New shoes should be worn by allowing the feet to get used to them | 12.0% | 4.0% | **84.0%** | Yes |
| 46-It is preferable to wear high-heeled shoes that bend forward | 10.0% | **52.0%** | 36.0% | No |
| 47-If there are a deformity in the foot, a doctor should be consulted for treatment | 2.0% | 4.0% | **94.0%** | Yes |

**Correlation Analysis**

A statistically significant, moderate negative correlation was identified between participant age and their overall knowledge score ($r = -0.300$, $p < 0.03$), as documented in Table 3-6. This finding indicates that younger nursing staff achieved significantly higher scores than older, more experienced colleagues.

**Table 3-6: Correlation between age and overall score**

| Index | | Score | Age |
|---|---|---|---|
| **Score** | Pearson Correlation | 1 | -.300* |
| | P Value | | <0.03* |

| | | | |
|---|---|---|---|
| | N | 50 | 50 |

No statistically significant difference was observed between the mean scores of male and female nursing staff (p = 0.92), as detailed in Table 3-7.

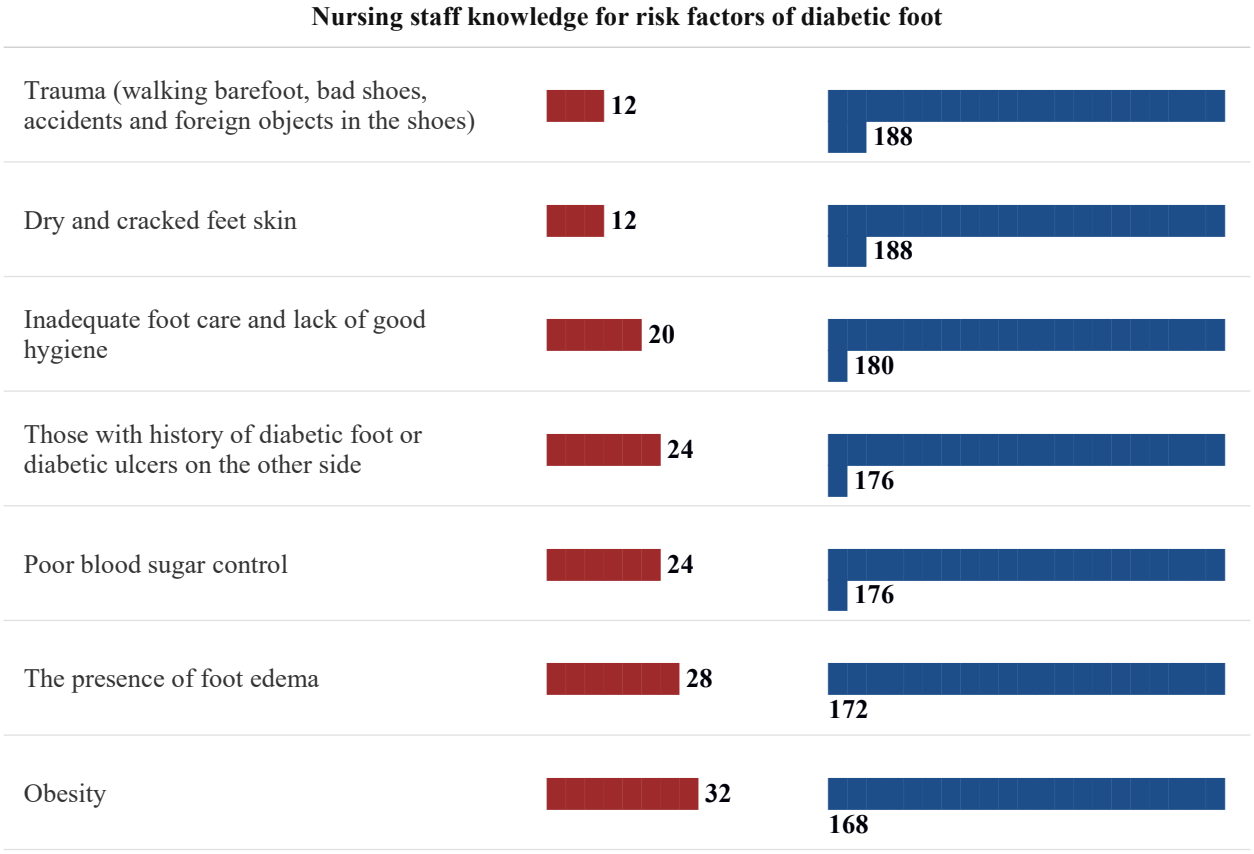
**Table 3.7: Correlation between gender and overall score**

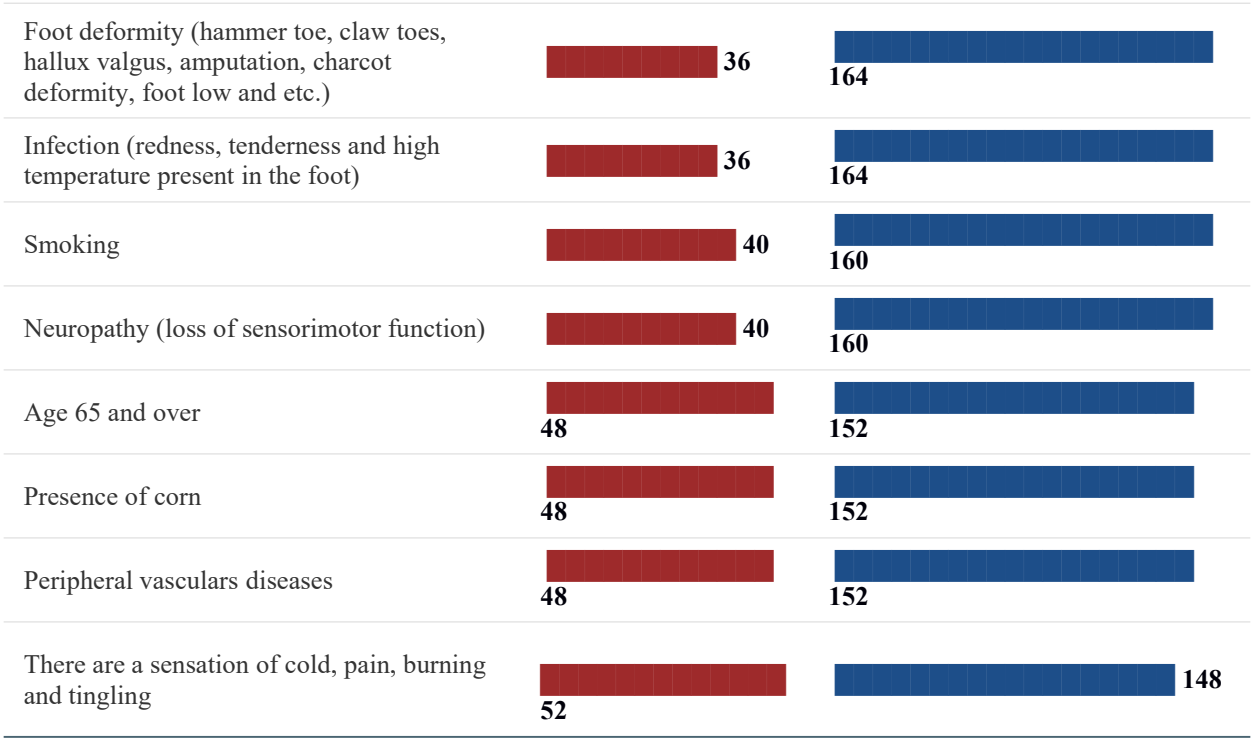
| Index | Sex | N | Mean score | Std. Deviation | P value |
|---|---|---|---|---|---|
| **Score** | Male | 88 | 38.14 | 7.809 | 0.92 N.S. |
| | Female | 112 | 37.96 | 5.131 | |

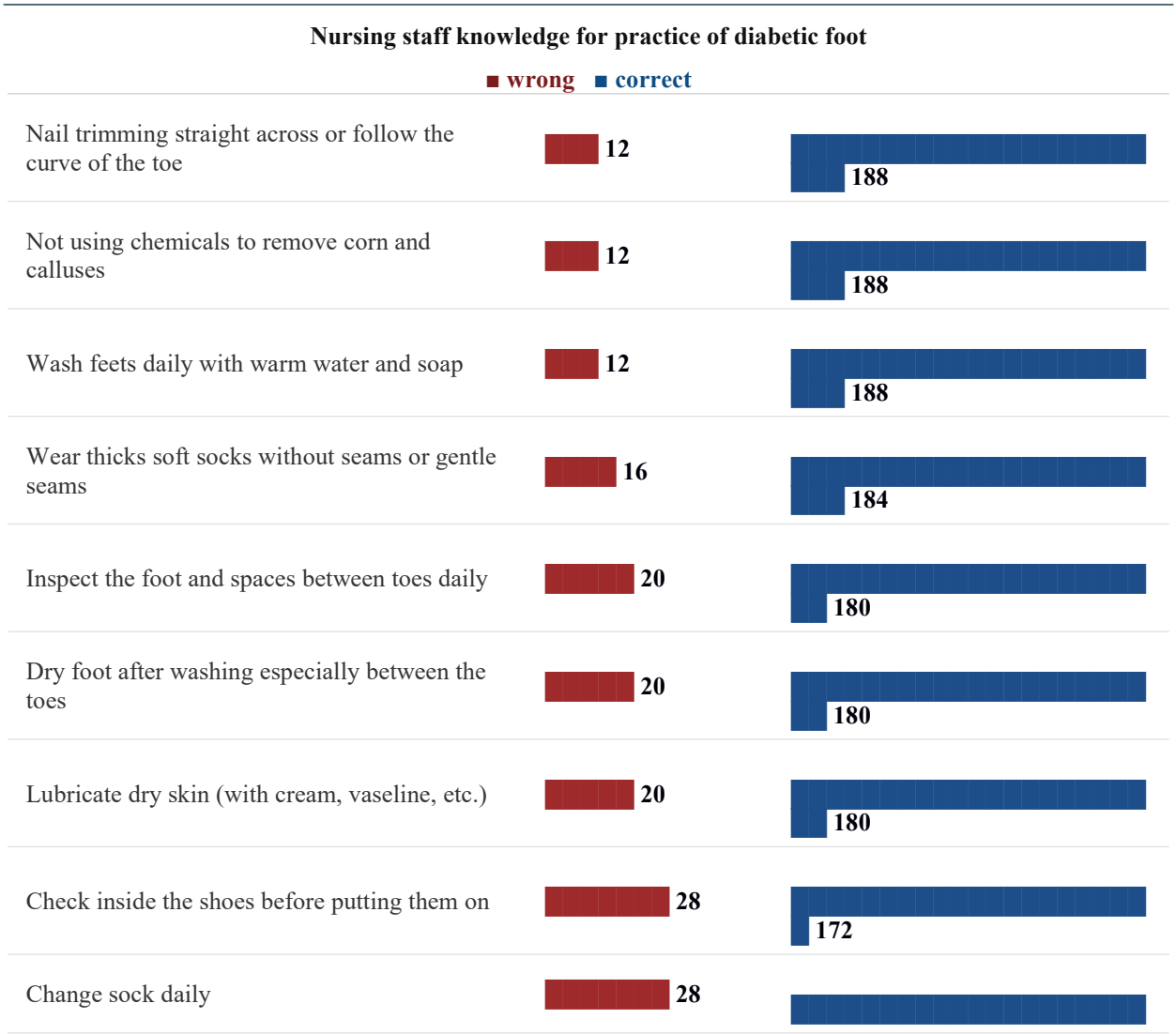
The highly significant statistically variations in the mean scores were found based on educational background (p = 0.01) as outlined in Table 3-8. Nurses staffs having a Bachelors degree was achieved the higher mean scores equal to (41.25 ± 2.79) followe by those with highest school diplomas (39 ± 2.91) while those possessing standard technical diplomas scored the lowest (35 ± 8.09). This highlights that higher formals academic degrees, qualification were the strongly predictor of superior clinically knowledge regarding diabetics foot care.

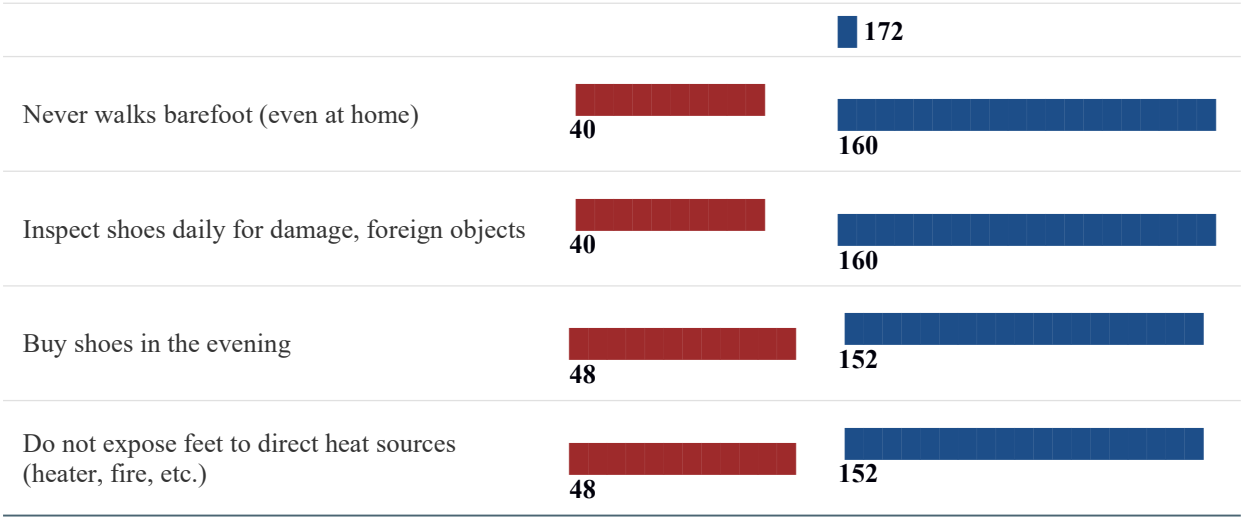
**Table 3.8: Correlation between educational background and overall score**

| Educational background | Mean score | SD | P value |
|---|---|---|---|
| **Bachelor** | 41.25 | 2.79 | 0.01** |
| **Diploma** | 35 | 8.09 | |
| **Highschool** | 39 | 2.91 | |

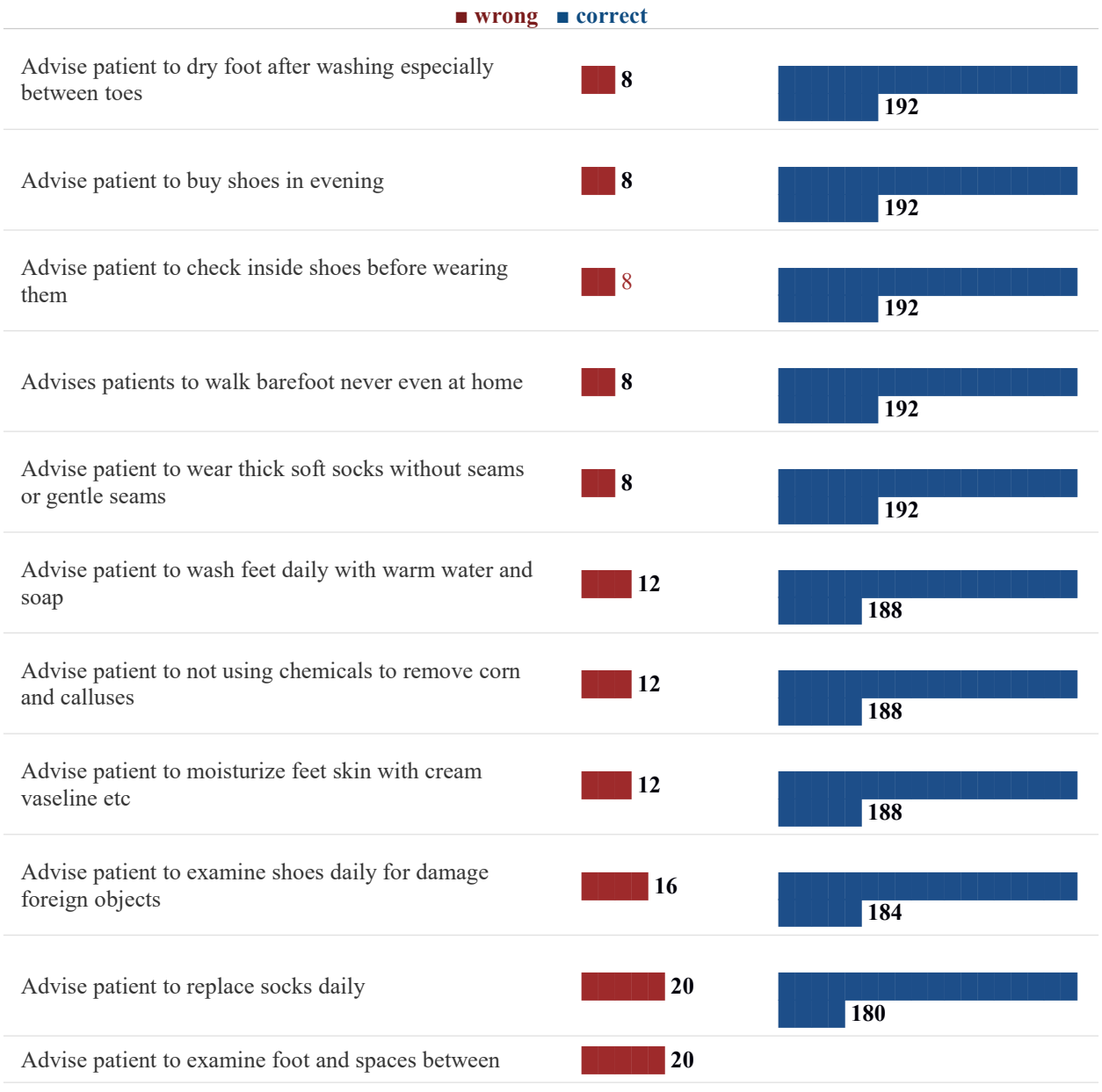


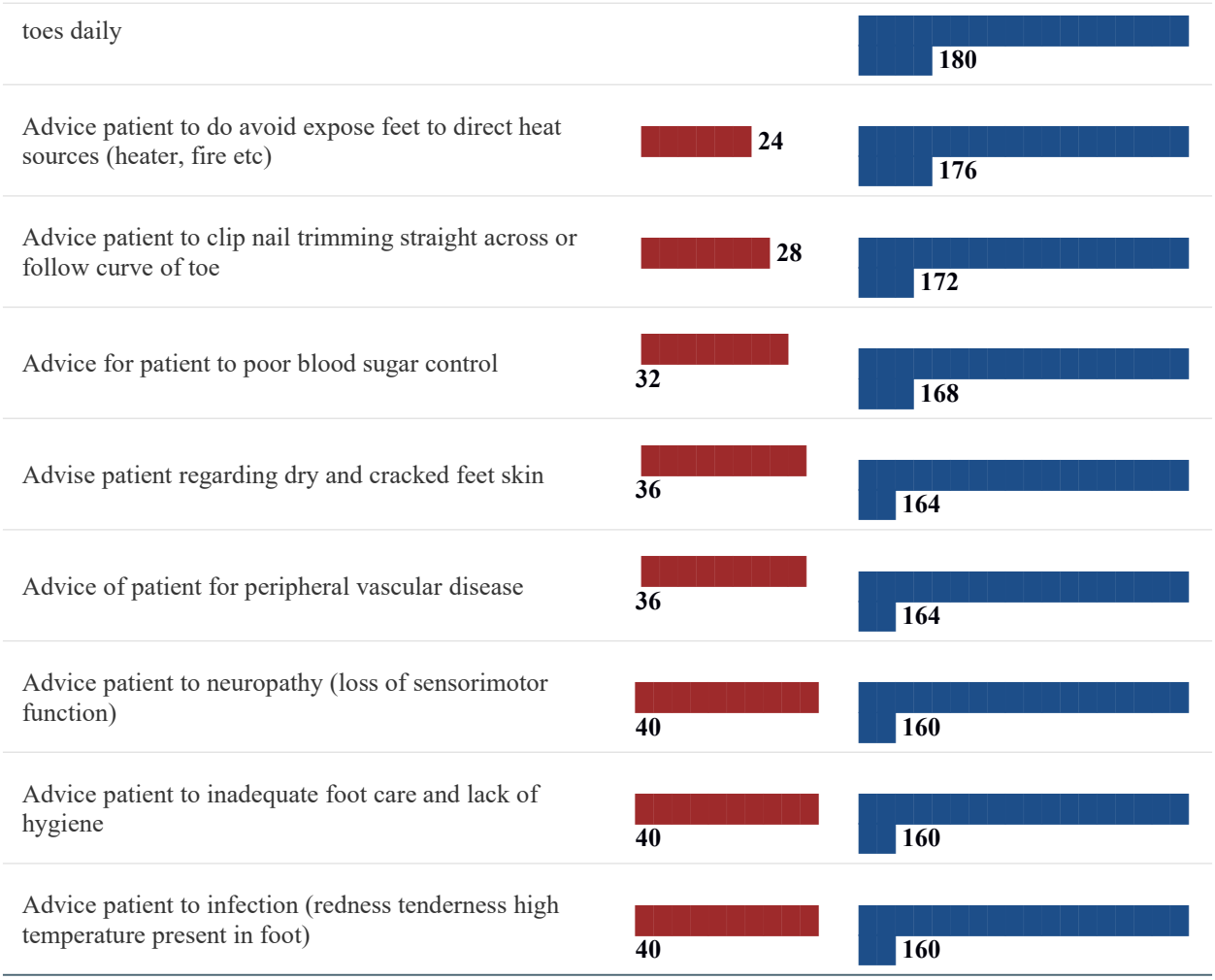

Foot deformity (hammer toe, claw toes, hallux valgus, amputation, charcot deformity, foot low and etc.)
36
164
Infection (redness, tenderness and high temperature present in the foot)
36
164
Smoking
40
160
Neuropathy (loss of sensorimotor function)
40
160
Age 65 and over
48
152
Presence of corn
48
152
Peripheral vasculars diseases
48
152
There are a sensation of cold, pain, burning and tingling
52
148


Nursing staff knowledge for practice of diabetic foot
wrong
correct
Nail trimming straight across or follow the curve of the toe
12
188
Not using chemicals to remove corn and calluses
12
188
Wash feets daily with warm water and soap
12
188
Wear thicks soft socks without seams or gentle seams
16
184
Inspect the foot and spaces between toes daily
20
180
Dry foot after washing especially between the toes
20
180
Lubricate dry skin (with cream, vaseline, etc.)
20
180
Check inside the shoes before putting them on
28
172
Change sock daily
28

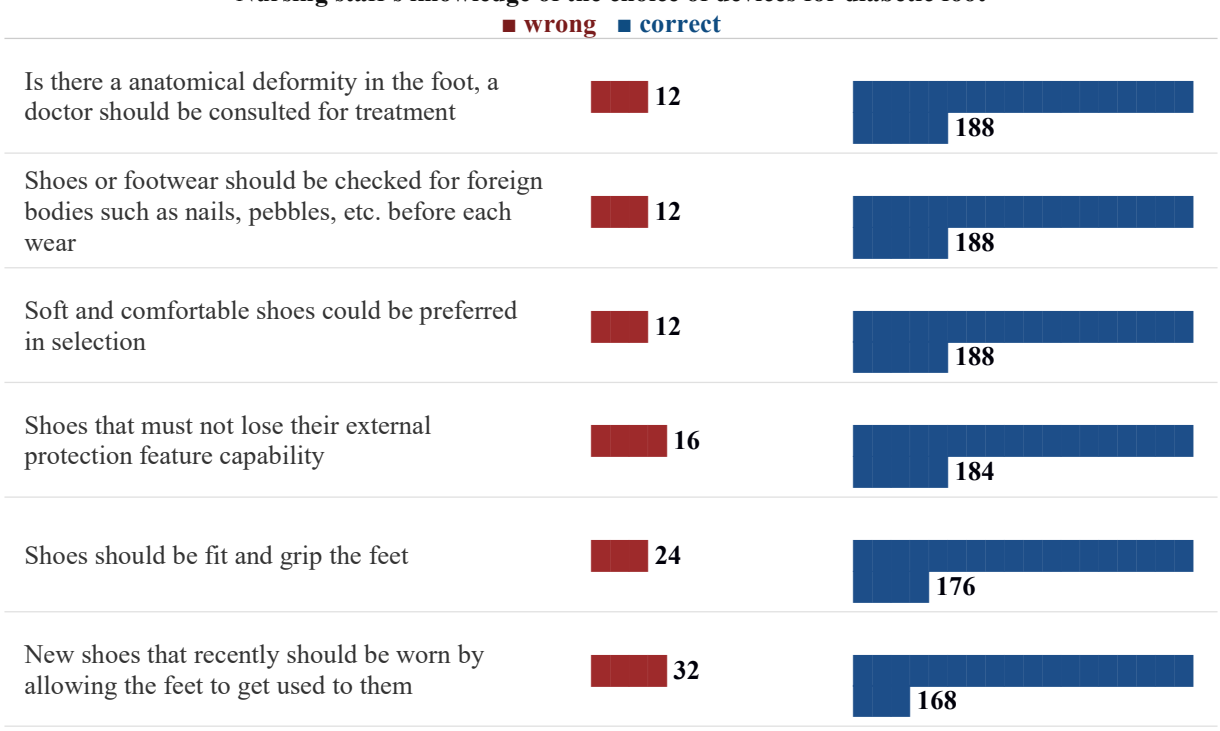


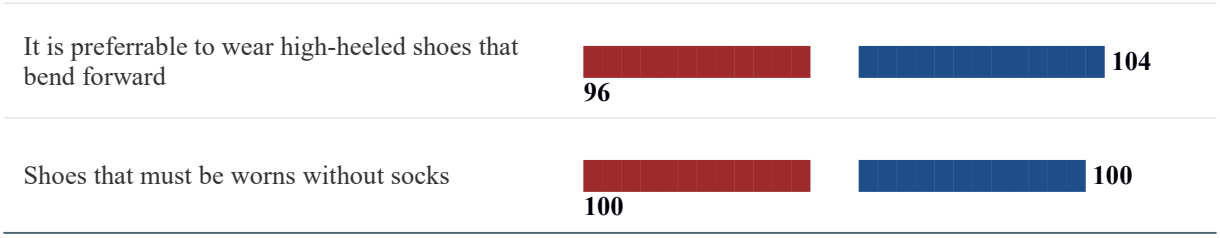

**Nursing staff knowledge for Attitude of diabetic foot**






**Nursing staff's knowledge of the choice of devices for diabetic foot**






**4. Discussion:**

Healthcare nurses professionals particularly bedside nursing staffs maintain continuous round the clock contact with hospitalized studies and are uniquely positioned to spearhead patients education. By contributing to the development and clinically execution of targeted educational protocols nurses could empower diabetic individuals to adopt positive selfcare behaviors thereby enhancing their overall quality of life. Furthermore, through the proactive identification of high-risk individuals within the communit nursing interventions could prevent or significantly delay the onset of severe diabetic foot pathologies. It is imperative to periodically assess nurses' professional competencies using verified, high reliability testing instruments.

To comprehensive maps nursing knowledge skill and practice assessing tools should be evaluate all risk factors influencing diabetics foot progressions. These includes evaluating competencies in proper devices/ footwears selections and comprehensive physically examinations more than focusing solely on basic risk awareness.

In this investigations the baselines knowledge levels for the surveyed nursings staff regarding diabetics foot care were generally high. They were majority of participants successfully identified primary risks factors; the highest correctness rate (94.0%) were recorde for Question 11 which addressed structurally trauma (inappropriate footwear, barefoot walking, accidents foreign objects). the lowest rights rates in this sub section (74.0%) were the recorded for Question 2 which concerned neuropathics symptoms ex: coldness localized pains burnings and tingling.
Regarding secondary complications knowledges for levels were even higher. Respondents achieved a perfect accuracy scores equal to (100.0%) on Question 26, recognizing the necessity for daily foot inspection using mirrors. accuracy fells to 78.0% on Question 35 which focused on the unsafe practices for using direct thermal heat sources for the warms cold extremities.

Advanced clinical understanding of these complications and high-risk indicators allows nursing professionals to stratify patient risks profiles accurately determine monitoring frequencies and identify when to execute urgent medically referrals. This is a critical aspect as diabetes mellitus dramatical accelerates the risks for lower limbs issues. Individuals with diabetes are up to 30 times more likely to undergo a lowers extremity amputation than non diabetics populations.

According to the WHO of a lower limb is amputated somewhere in the world every 20 seconds due to diabetes complications, despite estimates show that over 80% of these results are entirely preventable. Plantar ulceration remains the single most common pathway leading to serious infection in diabetic individuals. Without meticulous structured clinical care those localized lesions rapidly progress to deep tissues infections ischemic gangrene extensive amputation and increased mortality.

Peripheral neuropathy is a primarly the cause of diabetic foot ulcer that leading to a loss of protective sensation and structural foot deformities. In these patients even minor unrecognized mechanical trauma can trigger a chronic, non healing ulcer. Continuous weight bearing and ambulation on an injured foot due to the absence of protective pain or pressure feedback severely undermines the healing process. Were the combined with peripherally vascular diseases these lesions quickly transforms into highly ischemic, non healing wounds. Beyond these intrinsic metabolic factors, various external variables related to footwear such as localized pressure concentration, temperature, humidities, foot shear within the shoe, stiff insoles, and inadequate shoe depth could be aggravate diabetic ulcers. Managing these external elements requires careful monitoring of the wound environment.

Preventive healthcares strategies have proven high effectiveness for improving patient quality of life and reducing long-term healthcare expenditures. The core recommendations for preventing diabetic foot ulceration focus on daily visual inspections, continuous physical monitoring, localized temperatures controlling, and the prescription of custom orthotics footwear. To effectively suppress wound formation, clinicians must measure, monitor, and manage the key parameters driving ulceration, including mechanical pressure, skin temperature, and moisture.
In our study, participants demonstrated an excellent understanding of device selection for diabetic foot care. Specifically, 94.0% correctly recognized the importance of recommending soft, comfortables shoes and checking footwears for foreign objects. These practices are essential for minimizing localized pressure, friction, and moisturizing accumulation. Additionally, the staff showed strong proficiency in evaluating structural

deformities to gauge infection risk and determine if a formal physician referral was necessary.

While some of literatures suggests that cumulative years of professional experience strongly enhances clinical knowledge, our findings indicate otherwise. We observed a significant negative correlation between participants age and overall knowledge scores. This outcomes might be driven by recent highly formalized wound care training programs which have successfully bridged to the competency gap between less experienced newer graduates and senior staff.
This hypothesis is supported by the significant differences in mean scores based on educational background. Nurses holding a Bachelor's degrees ould be achieved the highest scores followed by high school nursing graduates while diploma holders scored lowest.

because of these studies relied on a localized sample these findings may not fully represent the broader nursing landscape. Data from the International Diabetes Federation (IDF) indicates that the global prevalence of diabetes mellitus is approximately 10.5%, affecting roughly 537 million people worldwides. for these populations up to 282 million individuals are projected to develop diabetic foot disease during their lifetime.

Given the highly prevalences mortality rates and significants socio economic burdens associated with diabetic foot disorders complications, these are an urgent cases to optimize healthcare systems and ensure nursing staff have agood knowledge and clinical attitudes toward diabetic foot managements.

**5. Conclusion**

This studies demonstrates that 200 of the surveyed nursing professionals have a satisfactory level of baseline knowledge regarding the risks factor complications, and medical devices associated with diabetic foot care. their level of knowledge was significantly influenced by these good educationally basic correlations analysis showed that nurses holding a Bachelor's degree achieved the highest performance scores.

Conversely advanced age did not serve as a positive factor in clinical knowledge, demonstrating a negative correlation with overall test scores. This suggests that extensive work experience does not automatically guarantee up to dates clinically knowledge. Based on these findings, we regarded that nursing staff regularly participated in the formal educational seminars and targeted training workshops on diabetic foot care to enhance clinical outcomes and alleviate the economic burden of the disease.

**Limitations and Future Recommendations**

This study has several limitations including: a small number ogsample sizes restricted to a localizing nursing population, a limited number of questionnaire items to assess complex clinical knowledge, and a relative scarcity of similar domestic research within the country to cross reference our findings. Further research show the utilization larger, multi-center cohorts and broader assessment tools to better evaluate nursing competencies nationwide.

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