

ORIGINAL ARTICLE

## Exploring Workflow Gaps in Diabetic Foot Care: Insights from Primary Care Clinics in Kuantan.

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### Abstract

The diabetic foot is a common complication of diabetes. According to the latest guideline on the management of diabetic foot (2018) from the Ministry of Health, it was suggested that primary care clinics develop foot protection teams to reduce hospital admissions, length of stay, and the amputation rate. However, there are barriers to establishing these teams. This research aimed to explore the current workflow for managing diabetic foot in primary care clinics in Kuantan. A purposive sample of 12 healthcare professionals was selected for this qualitative research project from four Kuantan primary care clinics with the highest number of recorded patients in the National Diabetes Registry. Semi-structured, focus group interviews were conducted via an online platform. Interviews were recorded and transcribed verbatim. The data were analysed via thematic analysis. The study identified three main themes: workflow, healthcare provider roles, and guideline implementation. Clinics lacked standardized workflows regarding operating hours, dedicated teams, and improper screening practices, which often deviated from established guidelines. The screening tools were outdated and not aligned with current guidelines. Guideline implementations appear lacking among healthcare providers mostly due to ignorance of the availability of the latest Clinical Practice Guideline (CPG). Before a diabetic foot protection team can be successfully built, several obstacles must be addressed. One potential project is the development of a clear workflow algorithm that can be employed in clinic settings.

**Keywords:** *diabetic foot, foot protection team, foot care services, primary care clinics, Malaysia.*

## Introduction

Diabetes mellitus imposes a significant global health burden, with foot complications being particularly severe and costly. In Malaysia, over two million individuals aged 20 to 79 had diabetes in 2011, a figure projected to increase by 50% by 2030 [1]. This rise is expected to coincide with more diabetic foot complications. Data from the 2020 National Diabetes Registry highlights persistent diabetic foot ulcers and amputations, which continue to strain healthcare systems [2]. Diabetic foot issues cause considerable mortality, morbidity, and financial burdens, with three-quarters of amputations in Malaysia linked to diabetes. A tertiary care facility on the East Coast reported an 11% incidence of major limb amputations among diabetic patients in 2013, with diabetics facing a 12.3 times higher risk of amputation than the general population [3]. The economic impact is significant, with acute diabetic foot infections costing RM 32,000 annually per patient [3,4]. Diabetic foot complications also severely affect quality of life, with major contributing factors including trauma, neuropathy, deformity, poor knowledge, inadequate foot care, prolonged diabetes duration, and smoking [5-7].

To address these challenges, the Ministry of Health (MOH) of Malaysia has formulated a Diabetes Foot Care Model to enhance patient care and facilitate seamless referral across healthcare tiers. However, significant barriers hinder effective implementation, necessitating a cohesive multidisciplinary approach involving endocrinologists, primary care physicians, diabetes nurse educators, dietitians, pharmacists, and podiatrists. Despite the presence of trained professionals, healthcare services remain fragmented, necessitating coordinated efforts to enhance patient access.

Data from the MOH underscores the predominance of primary care clinics as the initial point of contact for diabetic patients [8]. While new guidelines propose the establishment of foot protection service teams within primary care settings, clarity regarding team composition, responsibilities, and referral criteria remains

lacking. According to the international guidelines, the Foot Protection Service aims to prevent and treat simple active diabetic foot problems within the community, thereby averting complications that may lead to amputation [9]. According to the current Clinical Practice Guideline (CPG), this service should be led by a Family Medicine Specialist or a physician with specialized training in diabetic foot issues, complemented by a team consisting of podiatrists, diabetic educators, wound care specialists, and rehabilitation experts [10]. Evidence suggests that establishing such a service in primary care settings can significantly enhance outcomes for diabetic foot complications. A systematic review in 2019 demonstrated that the implementation of a dedicated multidisciplinary team effectively reduces the incidence of major amputations due to diabetic foot ulcers [11].

Hence, this study assumes significance in laying the groundwork for a structured framework to optimize primary care foot protection services, thereby enhancing diabetic foot care management and guideline adherence.

## Research Methodology

### Study design, population and sampling method.

This qualitative study used focus group discussions involving twelve healthcare professionals from four clinics with the highest number of diabetic patients, selected from the National Diabetes Registry. The chosen clinics were KK Bandar Kuantan, KK Beserah, KK Jaya Gading, and KK Paya Besar all having diabetic nurses, Medical Officers (MO), Family Medicine Specialists (FMS), and wound care services. Purposive sampling ensured participants met specific expertise criteria [9,10]. Respondents must have had over six months of experience in diabetic foot care and were proficient in English or Malay. Those who were on maternity leave, study leave, or working in other units were excluded. Data collection occurred between September 2021 and June 2022.

### **Data collection**

Amidst the pandemic, virtual focus group discussions with twelve healthcare providers were conducted via Zoom or Google Meet. Participants were split into three groups: diabetic nurses, medical officers (MO) in charge, and Family Medicine Specialist (FMS), with four members each representing their clinics. Identified as interviewees A (diabetic nurse), B (medical officers), and C (FMS), each session lasted 90-120 minutes using semi-structured questions. A semi-structured interview guide was developed to address the objectives of the study. The interview guide was pre-tested to the members of the study population that was not involved in this study to ensure clarity and refinement of the questions before actual data collection. The information gathered from the focus group interview was both comprehensive and sufficiently rich to address the research objectives.

### **Interview**

All the interviews were carried out by a researcher who was a trainee in the Family Medicine postgraduate program that had attended training in qualitative study. The researcher had not worked in the clinics being studied and had no affiliation with the participants. Respondents received an information sheet detailing the study's nature and purpose and gave informed consent before the interview. The interviews were conducted online, with a video inspection of the participants' rooms to ensure that only the intended participants were present during the interview. Prior to the interviews, recording consent was obtained, and participants were briefed on the study's structure. If interviewees made unclear statements, the interviewer intervened to seek clarification. Throughout the interview, respondents were encouraged to share additional insights or discuss topics they felt had been overlooked. At the end of the session, the interviewer expressed gratitude and cross-checked participants' thoughts. Interviews were transcribed verbatim in either Malay or English

immediately after the session, with field notes maintained to ensure context preservation.

### **Data Analysis**

Thematic analysis was used to examine patterns in the data. NVIVO 12 was employed to code interview transcripts and categorize them into common themes. The research team discussed and finalized these codes and themes. Quotations were translated into English to illustrate each theme. The analysis followed Braun and Clarke's six phases: data familiarization, initial coding, exploration, labelling, theme review, and report compilation.<sup>12</sup> Broader patterns were identified as superordinate themes, with specific categories termed sub-themes.

### **Ethical Consideration**

Ethics approval was provided by the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia, reference NMRR-21-1252-60118. Written informed consent was obtained before the interviews.

### **Results**

#### **Sociodemographic characteristics of the respondents**

The total number of respondents was twelve. The respondents' ages range from 31 to 55 years old, with a mean age of 43. The respondents consisted of four FMSs, four MOs and four diabetic nurses. All were Malays except for one Chinese.

#### **Current structures in diabetic foot care service**

The primary aim of this study was to examine the existing framework for diabetic foot management in primary care clinics in Kuantan, Malaysia. Three key themes emerged to elucidate this framework: the workflow of diabetic foot care, the roles of healthcare providers, and the implementation of current guidelines in foot care.

## **Theme 1: Workflow of diabetic foot care**

Three subthemes were identified within this theme: "Operating hours for diabetic patients," "Absence of a dedicated foot care team," and "Diabetic foot screening conducted only for symptomatic patients."

### ***Operating hours for diabetic patients***

The study revealed variations in operating hours for diabetic patients across the four primary care clinics. Some clinics designate specific days for diabetic patient consultations, such as Tuesdays: "We have a specific day to see the DM cases which is every Tuesday." (A3)

Others see diabetic patients daily:

"We divided to outpatient and NCD clinic. Hence no specific day to see the DM cases. The doctor was allocated according to this." (A1, A2, A4)

### ***The absence of a dedicated foot care team***

Data from this study revealed the absence of a dedicated foot care team in primary care clinics. Respondents across various clinics concurred with this finding:

"There is no specific team in managing the diabetic foot. They usually will be managed by the wound care team if they develop any wound or ulcer." (C4)

### ***Diabetic foot screening is conducted only for symptomatic patients***

This subtheme highlights that diabetic foot screening is conducted solely when patients exhibit symptoms. Respondents provided insights on this practice:

"Usually, we will ask if they have any symptoms of diabetic foot. Then, we will examine their feet." (A1)

## **Theme 2: Role of healthcare provider in diabetic management.**

This theme delves into the responsibilities of healthcare providers in addressing diabetes management within primary care clinics. Three distinct sub-themes have emerged: the involvement of various healthcare providers in

diabetic screening and the specific roles of both medical officers and family medicine specialists.

### ***Different healthcare providers do the screening.***

The findings of the study indicate that diabetic foot screening was conducted by various healthcare providers, predominantly by nurses. Respondent A1 asserted,

"Typically, all screening procedures are carried out by us" (A1).

In contrast, Respondent A3 disclosed,

"In our clinic, a similar approach is adopted, albeit with the assistance of occupational therapists who aid in conducting diabetic foot screenings" (A3).

### ***Medical officer role:***

Other responses indicate that medical officers typically attend to patients after they have been seen by nurses or if any issues arise during the screening process. For instance, Respondent B4 stated,

"Nurses conduct the screening, after which we assess the patient" (B4).

Respondent B3 added,

"We evaluate the patient, provide treatment, and primarily focus on educating them about medication adherence, sugar control, and diet management" (B3).

Similarly, Respondent A1 expressed,

"We handle the screening procedures, and if any complications arise, we refer the patient to a doctor. The doctor then assesses, treats, and refers if necessary" (A1).

### ***Family Medicine Specialist role:***

This subtheme elucidated the role of Family Medicine Specialists (FMS) in the management of diabetic patients. As articulated by Respondent C1,

"Medical officers initially assess the patient, and if necessary, they refer the patient to me for additional management. My responsibilities include overseeing clinic operations and conducting audits to ensure adherence to diabetes care guidelines."

This perspective was corroborated by other respondents C2 and C3.

### **Theme 3: Implementation of the latest guidelines in diabetic foot care.**

This theme focuses on the utilization of the latest guidelines for foot care in primary care settings. It comprises three subthemes: reliance on the diabetic book as a reference, lack of awareness regarding the latest foot care guidelines, and the availability of the current Clinical Practice Guidelines (CPG) as a reference in clinics.

#### ***Reliance of the diabetic book as a reference.***

Regarding the use of the diabetic book as a reference, Respondent A4 stated,

*"We utilize the diabetic book for screening purposes as it is readily available in the clinic and easily accessible. Subsequently, we document the findings in the book."*

This viewpoint garnered agreement from other participants. Similarly, Respondent B1 noted,

*"In my clinic, nurses conduct the screening, and I've observed they utilize a diabetic book."*

This perspective was also supported by other respondents.

However, Respondent C1 expressed disagreement, emphasizing,

*"Screening should adhere to the checklist outlined in our CPG, followed by risk stratification. This approach enables appropriate management of diabetic foot issues based on the patient's risk level."*

This stance was shared by other respondents (C2, C3, and C4).

#### ***Lack of awareness regarding the latest foot care guidelines.***

Several respondents were unaware of the existence of the latest Malaysian Clinical Practice Guidelines (CPG) for diabetic foot management. Respondent A2 expressed surprise, stating,

*"I wasn't aware of a new CPG for diabetic foot. I've never come across it."*

This sentiment was echoed by Respondents A1 and A4, who stated,

*"Oh, is there a new one? We only have the old version in our clinic. Therefore, we refer to the*

*old CPG if there's uncertainty in screening and management."*

#### ***Availability of the current CPG as a reference***

While some respondents were unaware of the latest foot care guideline, others are cognizant of it but lack access to it for managing diabetic foot issues.

Respondent B3 stated that,

*"I'm aware that the guideline includes a checklist for diabetic foot screening, but it's not accessible in our clinic. Therefore, I rely on what's available, like the diabetic book."*

### **Discussion**

Understanding the current framework for managing diabetic foot is essential for improving services and outcomes. This study identified three key themes: workflow, healthcare provider roles, and guideline implementation. The analysis revealed a lack of standardization in operating hours for diabetic patients across the four primary care clinics studied. Some clinics designated specific days for diabetic patients, while others provided services every weekday. This variability aligns with a survey by Mustapha et al. (2020), which highlighted differences in the number of days clinics allocated for diabetes appointments, ranging from 2 to 5 days a week [12]. This variation may be attributed to staffing levels and patient burden.

Additionally, the absence of dedicated diabetic foot care teams was observed. This finding aligns with a study by Hussein et al. (2015), which noted disparities in diabetes teams among clinics. Some had dedicated teams led by trained personnel, while others did not. Variations were due to community diversity and logistical differences between urban and rural clinics, with urban clinics better equipped [8]. Generally, Malaysian primary healthcare settings lacked dedicated diabetes teams, possibly due to high disease burden and staff shortages, leading to multitasking, inefficiency, and suboptimal care [13].

The screening of diabetic foot conditions plays a crucial role in preventing problems among diabetic patients, and it is recommended to conduct such screenings at least annually for diabetic individuals [14,15]. Surprisingly, this study found that diabetic foot screenings are typically only performed when patients exhibit symptoms, aligning with the findings of a study by Ranuve et al (2022). In that study, healthcare workers (HCWs) acknowledged that they do not routinely provide foot care advice to diabetic patients without diabetic foot ulcers (DFU) during clinic visits. Foot care advice is typically given only to those who have already developed DFU. Some respondents in the study mentioned that they may defer foot assessments if patients attribute symptoms like numbness to factors such as cold weather [16,17]. This approach poses a serious concern, as many diabetic foot complications stem from peripheral neuropathy, leading to a loss of protective sensation. Therefore, regular foot screenings for all diabetic patients, regardless of symptoms, are essential. Husna et al.'s study supports this approach, revealing that patients with a foot at risk often lack knowledge and awareness of diabetic foot care [6,7]. Healthcare providers must prioritize regular screenings and educate diabetic patients on foot care to enable early prevention and detection of potential issues. It is crucial to address challenges such as a shortage of resources, including insufficient staff, multitasking demands, and a high volume of diabetic patients. This situation warrants attention from superiors and policymakers to ensure effective and optimal care for diabetic patients.

A noteworthy finding in this study is the diverse roles of healthcare providers in diabetic foot care. Foot screening is often conducted by various professionals, predominantly nurses. Some clinics have occupational therapists and rehabilitation staff for screenings, while others lack such specialized personnel. The presence of diabetic educators varies, with the Ministry of Health (MOH) survey indicating that only 6 out of 10 clinics have these professionals. These

educators often have additional duties like managing screening counters and reviewing blood investigation results. The study highlights nurses' responsibilities in conducting foot screenings and referring patients to medical officers when problems are identified. This aligns with a survey by Feisul Idzwan Mustapha et al., which found that nurses ensure the completeness of screening for diabetes-related complications and trace blood investigation results [12]. Medical officers play a crucial role in examining referred patients, providing treatment, educating on diabetic foot care, and making necessary referrals. Feisul's survey also noted that medical officers in some clinics are responsible for the complete documentation of medical records [12]. The implementation of the latest guideline is another aspect supporting the current practices of healthcare workers in Kuantan, Malaysia. Findings from this study suggest that guidelines for treating diabetic foot have not been fully integrated into clinical practice among the respondents involved. Similar results were seen in a study across four Nordic countries, where only 39% of respondents reported using the guidelines, despite their introduction over 15 years ago [18]. Factors influencing the adoption of these recommendations include healthcare providers' expertise and patients' understanding of the disease [19].

Interestingly, many respondents rely on diabetic books, often referred to as the "green book," as their primary reference for diabetic foot screening. These books, established in 2000, serve as standard clinic-held records for diabetes management, facilitating continuity of care between different service providers. While the diabetic book includes a checklist for diabetes-related complications, it may not cover all aspects of diabetic foot screening compared to the official Clinical Practice Guidelines (CPG). Furthermore, findings indicate that healthcare providers have not fully adhered to the CPG's checklist for diabetic foot assessment, which includes symptoms and various examinations to stratify risk levels. This finding is similar to a study done

in Scotland, in which they found that none of the general practitioners or nurses interviewed had ever completed the Scottish Care Information-Diabetes Collaboration (SCI-DC) foot risk assessment tool despite diabetic foot risk assessments being a part of the Quality and Outcomes Framework [20].

Additionally, a significant portion of healthcare providers were unaware of the updated version of the CPG, indicating a lack of training and dissemination of information. A study by M. Gershater (2016), supports this and shows a lack of awareness of the existing guidelines among healthcare providers [21]. A study by J. Commons et al.(2018) also highlighted that clinicians might be unaware of the guidelines or sceptical of the value of guidelines because of their lack of evidence base [22]. The CPG of the diabetic foot had been developed to facilitate a continuously updated version of the care process for this vulnerable patient group. The responsibility for organizing teamwork, motivating team members, and facilitating education lies with team leaders, especially considering varying levels of knowledge and resistance to change among team members.

Availability of the CPG is also a concern, with many respondents reporting difficulty accessing it in their clinics, potentially due to budget constraints or lack of awareness. This is corroborated by a study conducted in Western Australia, which revealed that the 2011 National Health and Medical Research Council, Australia guidelines had received very little prior use, the stratification of the intermediate risk category was subpar even after training, and the resources needed to conduct a diabetic foot assessment were not readily accessible in the state's rural and remote health services [23].

## **Conclusion**

This study reveals discrepancies in diabetic foot care practices compared to guidelines, highlighting non-standard workflows and lack of dedicated teams. It urges prioritizing foot care

training and support at all healthcare levels to improve practices, emphasizing the need for management oversight and effective guideline dissemination. Integrating the CPG on the Management of Type 2 Diabetes Mellitus (6th Edition) with the CPG on the Management of Diabetic Foot (2nd Edition) into a single, comprehensive guideline for diabetes management in primary care would enhance accessibility and promote a more holistic approach. This combined CPG would provide healthcare providers with a streamlined reference that addresses both glycaemic control and the prevention and management of diabetic foot complications.

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## **Authors Contribution**

The first two authors are the main contributors to this study in designed, managed and wrote the paper. The remaining authors provided intellectual and technical input to the manuscript for publication.

## **Ethical approval**

Ethics approval to conduct this study was obtained from the local medical research ethics committee (MREC: NMRR-21-1252-60118).

## **Conflict of interest**

The authors declare that they have no conflicts of interest.

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## **Data sharing statement**

Data only available upon request

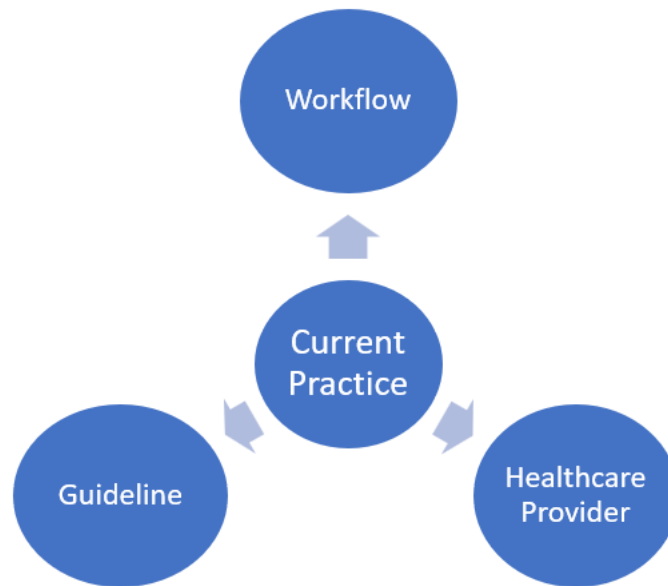


Figure 1. Current structure in managing diabetic foot.

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